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An Improvement in Steam Pumps.

BEFORE speaking at length of the steam pump here illustrated, it may be well to notice the defects inherent in the use of ordinary forms of pumps and valves in certain situations, and also to note some of the sources of trouble in using them. Simple valves, that rise and fall as water passes through them, clatter or thump as they seat themselves. As the head under which the pump works increases, so does the noise, sometimes rendering a whole building uncomfortable while the pumping is going on. This is a frequent source of annoyance in hotels and dwelling-houses. If one of these valves gets clogged by a chip, or anything of the kind, under the seat, it will stop the pump from acting, at least on one side, even if there are a number of valves. Rubber passed through a valve makes it a fine one in ordinary situations, but is so softened by hot liquids, that the mechanical action soon destroys it. In the same way, where it is used for the packing of pistons, when hot water reaches it, the heat so softens the substance that it is completely destroyed for useful action. Leather pistons are subject to injury from the same cause. In pumping hot water with ordinary pumps, the reservoir must be situated above the level of the valves, in order that it may flow in by its own weight; otherwise, the vapor, by its elasticity, prevents the seating of the valves, and only a small stream of water is obtained. In designing the subject of our illustration, especial effort has been made to meet and overcome each of the difficulties which we have named; and, judging from what we have seen of their operation, we think successfully. The general description of the pump will be enough for the practical mechanic, because from it he can readily see whether the mechanism will answer the demands and claims made for it.

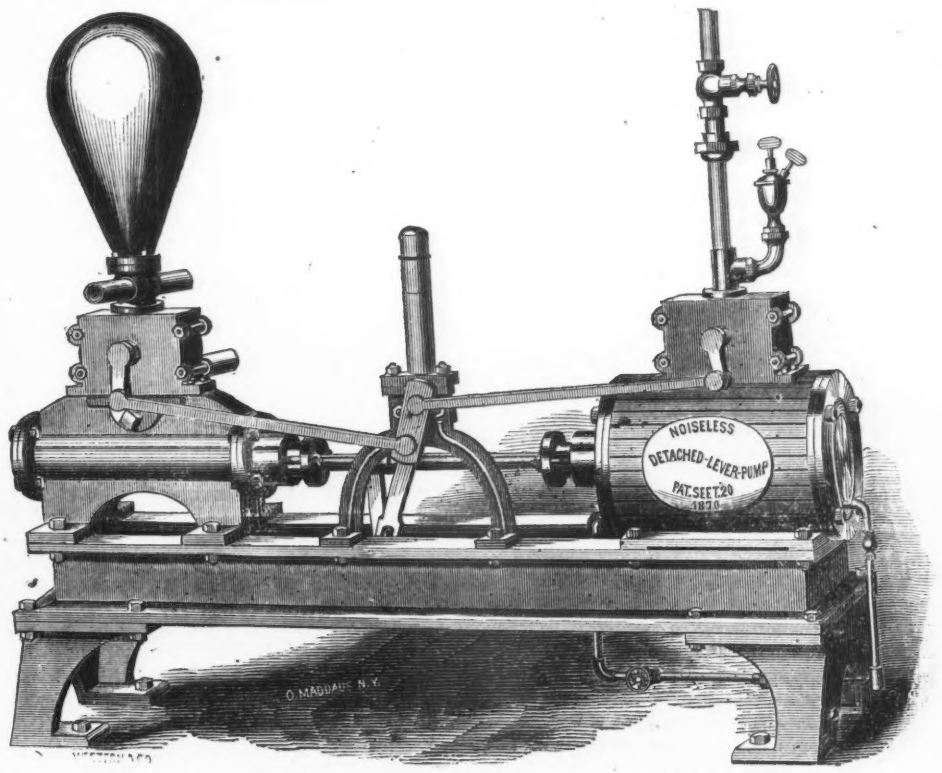

Fig. 1—IMPROVED DETACHED-LEVER PUMP.

FIG. 1 shows the general arrangement of pump, steam cylinder, valve motion, steam chest, etc. The first noticeable feature is that both steam-chest and valve-chest for pump are alike, being simple boxes, covered with plain plates, through which the valve-stems pass. The valves are cylindrical, of one solid brass casting, ground into their seats, and supported by the steel spindles that pass through their centres. The valves, which are alike in design, differ only in having the water openings much longer than those for steam. Steam or water is taken through the centre, in such a way that there is no pressure on either seat or spindle, making a perfectly-balanced valve. Wear is, of course, in this case reduced to a minimum. As the valve never leaves its seat, and its motion is only a sliding one, there is none of the heavy pounding common in most pumps. It is not claimed that the pump is so noiseless that you cannot hear its working when close to it; yet it is a fact that, when running very fast, under a great head of water, it will not make sufficient noise to be heard through a closed door. On the other hand, most of the pumps in use, when working under similar circumstances, make a noise that can be heard throughout a whole building. In pumping hot water, the positive motion of the valve is a great advantage, making it entirely independent of the vapor, which renders other valves inoperative. In practice, it is found that the valve, when dirty water is being pumped, again and again pushes obstructions away from the ports, enabling it to work where other pumps would be likely to clog. The valves, both of the steam chest and the pump, are operated by rods connected with a double rock-shaft, the one above and the other below its axis, and hence receive opposite motions, as shown near the centre of the engraving. This rock-shaft passes through a journal in the iron supporting frame, and receives its motion from a short lever on the other side of the frame, which is attached to the rock-shaft by a set screw. This lever is parallel with the rock-shaft, and points downward. Unfortunately, it is not shown in either of our engravings. In FIG. 1 it is concealed by the standard, and in FIG. 2 by the tumbler, C. It must not be confounded with the lower arm of the lever, B, with which it has no connection. The remaining part of the mechanism is shown in FIG. 2, which is an enlarged view, taken from the rear. E, is a V-shaped point, pressed down by a spring contained in a cylinder shown in section, but all the parts below are in perspective. Over the little lever just mentioned is bolted the yoke, D, to which a pivot is firmly attached, having its axis in a line with the rock-shaft, but entirely unconnected with it. On this shaft the tumbler, C, is first placed. This is essentially triangular in shape, and is provided with two lugs, D and E, below the axis of oscillation, and with the roller, B′, on a similar lug above. This tumbler is totally unconnected with anything else, and moves freely on the shaft. Over this comes the lever, B, B, provided with two lugs, A′ and C′, above the axis of oscillation. On top of all comes the nut and washer, shown plainly in the cut. The lever, B, receives its reciprocating motion from the piston, by means of the arm, A′ below the bed-plate. The lug, A, of this lever, it will be observed, is in contact with lug, B, of the tumbler, which it rotates, raising the wedge, E, and forcing up the spring until the roller, B, has slightly passed the centre. When this point has been reached, the spring rapidly forces down the wedge, E, and shoves the tumbler, C, around at a much more rapid rate, until it strikes the lug, C′ on the lever, B. In the meantime, the lug, E′, of the tumbler has caught the end of the lever first mentioned, and shoved it forward. Since the rock-shaft which moves the valve-rods (shown in FIG. 1,) is secured to this lever, it will also have been moved, and changed the position of the valves, both of the steam and pumping cylinder. The India-rubber washer, R, prevents the nut on top from striking a blow when the spring presses the point down to throw the valves. This throw, it is well to remark, is almost instantaneous, no matter how slowly the pump may be working; for the moment the centre of B′ passes E, there is no resistance to the spring, and the throw is accomplished in an instant.

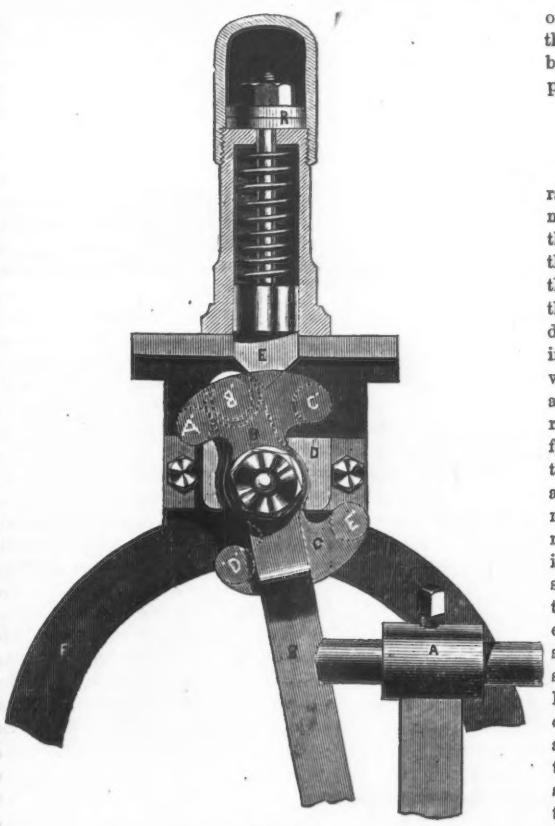

Fig. 2.

To quote from the specification of the patent, "the object of this invention is to construct a link-motion for operating the valves of steam pumps and engines, which will adjust itself so rapidly that the water or steam will be suddenly reversed, so that a dead-centre will be overcome." This is actually accomplished. There are no dead-centres in the stroke. No matter how slowly the piston moves, the spring reverses the valves in an instant. In fact, a dead-centre is an impossibility. The rubber washer or cushion, R, is of great advantage, as it makes the noise of the levers scarcely perceptible. These pumps are manufactured by the well-known Woodward Steam Pump Manufacturing Company, Nos. 76 and 78 Centre street, New York.

Scientific Education to Miners.*

By the Very Rev. Dean of Durham.

IN bringing before you the question of the best means for raising the education of the young men who are intended to be miners and engineers, I will at once say that it is one which the peculiar circumstances of the North of England render more than ordinarily interesting to ourselves. The very meaning of the migratory habits of these great scientific societies is that they may ascertain both the capacities and requirements of the different parts of England, which they successively visit; and if I remind you that there is probably no part of England where mining wealth and both mining and engineering activity are so abundant, and that there has been no age when scientific research has been more active, I need not hesitate to go a step further, and add that it is desirable to bring these two facts into the closest possible connection, to make science assist mining and engineering, and to give to our practical miners and engineers that higher knowledge of their art, which will certainly raise them as men of education, even if it is not (as I believe it is) absolutely necessary to the highest success in their profession. I acknowledge, indeed, to a real reluctance to speak on this subject myself, where neither my knowledge nor experience entitle me to address you; nor should I have ventured to do so, had I not felt that it might be of some advantage even to start the subject, however imperfectly I may treat it; and as I know that in my own studies and profession great advantage is often gained from the criticisms of those who look at them from a distance, so I have some hope that even in scientific matters the thoughts of a mere outsider, who simply looks upon the subject as one of general education, may not be wholly without their value.

In what I have to say, I will take three points for consideration: (1) What is the importance, especially to practical men, of something like a careful education in physical science? (2) Is this education sufficiently given at present to that class of which I am chiefly speaking—our miners and engineers? (3) By what means can we best advance it? Now, I hope I shall not be thought to be asserting a simple truism when I begin by expressing the opinion that in every profession a man is made better, both as a workman and as a man, by possessing a clear,

* A paper read at the Social Science Congress at Newcastle.

and what may be called a scientific knowledge of its principles. I should not thus start from the very beginning, if I did not feel that here, as in most parts of England, we have to deal with a little not unnatural prejudice in the matter—for, no doubt, as a nation, we have been eminently successful in all the arts of material improvement and prosperity, and there are still many among us who are inclined to say that we have hitherto managed to bungle on pretty well—that an Englishman can do by energy more than another man does by science, and that, though science may be very good for the *élite* few, yet if we try to turn most of our workmen into scientific men, we shall only be creating a class of conceited blunderers. Let us deal good-naturedly with this objection—though I think it seldom proceeds from men who have had much education themselves, but from that class whom a friend of mine has happily nicknamed the "Philistines," or the born enemies of light and progress; and let us allow that it has just about the value of the old objections to education of every kind.

No system in the world is without some drawbacks, and you are as sure to have some who will suffer from education as you are to have others who will suffer from over-training of the body; but, in both instances, the test will be, not the failure with the few, but the success with the many; and, regarding it in this light, I venture to say, at starting, that it is almost a truism that a man will be better fitted for mining and engineering work who shall start in his profession, not with the mere experimental knowledge which he will gain by three or four years passed in the works, but with a fair training in mathematics, in chemistry, in dynamics, or in geology. I am not, of course, speaking of the very humblest class of workmen engaged in such occupations, though I certainly look forward to the day as not far distant when the humblest schools in the North shall embrace something of what the Germans call "an acquaintance with the earth," as a means of raising the intelligence and improving the prospects of poor children; and though I was happy to hear Sir WILLIAM ARMSTRONG say a few words, equally wise and generous, this morning, in favor of hundreds of our workmen who have within them the power to rise if you show them the way, and whose wasted talents have been so much loss to their country, when "chill poverty repressed the generous rage and froze the genial current in their soul." But for the present it is not so much the poorer schools which I take into consideration: what I mean to urge now is, that for all schools above the lowest, beginning from the humbler middle-class schools, going on to the schools for the rich, up to the public schools and the universities, a knowledge of nature, in some two or three of its principal forms of operation, has become, I will not say desirable, but necessary. And I add that, here in the North more than anywhere else, it is, in some measure, discreditable to us at present, and it will become increasingly a disgrace to the men of wealth and intelligence of this generation, if (supposing we are ignorant of these things ourselves) we do not prevent this ignorance from becoming hereditary, and do not enable our children to say that, "Thanks to our parents, we know more than they do." But I will come to closer quarters, and take, first, the case of the miner. When you ascend above the humblest class of the ordinary miner, you have here, I believe, three kinds of men to deal with: (1) the ordinary overlookers, whose numbers are calculated at about 12,000; (2) there are said to be about 3,000 "underviewers" or overmen; and (3) something like 500 of a higher class of viewers or mining engineers. I speak of miners only, but I apprehend that something like the same proportion will be found to exist among the upper workmen in iron-works and similar occupations. Now, with regard to the last of these classes—the highest of all—I do not venture to say much. The ability of our great engineers and miners is undisputed; and when we pass through any of your great iron-works, we are simply astonished at the thought both of the scientific knowledge and the administrative capacity required to manage it. Still, we might certainly venture to wish that, as regards England and the North, this knowledge was more "home-bred," and that young men were not obliged, as so many of them are, to get their training from France, Germany, or Switzerland, or even from London and Edinburgh. When we consider even this highest class of miners and engineers, it is certain that many of them must, in their youth, have been unable to afford an expensive education: and I contend that it would be an immesurable service to such men, and one which this country ought to offer them, if instead of having to learn nearly everything for themselves, or to go abroad to obtain it, they could be supplied at small cost with the starting-point in life of a good scientific education. I find Mr. ISAAC LOTHIAN BELL expressing this opinion in some evidence which he gave on this subject: "I should like to have young men of a superior stamp under my eye, but the means of education in the North are of such a character that these are very difficult to be got at;" and he afterwards states that "it is easily got in France, at the Sorbonne, the Institution of the Ponts et Chaussées, or the Arts et Métiers. It is easily got, and almost at no cost." And he adds his own experience, that similar education was to be got at Edinburgh. I cannot help suspecting, then, that even as regards the highest class of students in the profession of mining and engineering, it might be desirable that there were more institutions in England, particularly in the North of England, where they could receive a thorough grounding in scientific knowledge. So far as I am able to judge, I am not myself of opinion that this should be of a very practical character, such as showing boys how to construct a steam-engine, and the like. This kind of playing at scientific work would, it seems to me, be learnt far better when they have got into their profession; and it is open to the objection which officers often make to the military training of boys at Sandhurst, that it is likely liable to be learnt badly, and then can never afterwards be unlearnt. What I mean is, that our object should be rather to give a boy a thorough knowledge of scientific principles, a knowledge which, beginning with mathematics, would go on to chemistry, hydraulics, hydrostatics, pneumatics, and practical chemistry or geology. And I believe such a profound knowledge of the principles of what is afterwards to be their business, would at once be an elevating discipline for the mind, and would be more likely to give us great discoverers than our present hand-to-mouth teaching is. Such institutions are springing up elsewhere, as at Owen's College, Manchester; and we ought to have them further north.

Permit me as shortly as possible to give some examples to show what is the kind of education which I had in view in speaking thus. First, the principles of mathematics apply to all the phenomena of motion, and hence an engineer can have no certain knowledge of his work, unless he starts from a good groundwork of mathematics. But, besides this, what can he do without a sound knowledge of mechanics, for the theory of machines, and their means of construction, repair, and improvement, are the very subjects of his daily occupation? He has to make his experiments on the strength and property of metals, on the application of geometry to construction, in fact, mechanics, in some shape or other, meet him at every turn of his work. Or take, again, hydraulics. Here, at once, the scientific knowledge of the fluidity and gravity of liquid bodies enables him to make use of their pressure as a motive power, as exerted (for example) on the bottoms and sides of vessels; not to speak of the very common cases where he is called upon to meet the contingencies of confined fluids and liquid in the pit-shafts of the abandoned workings of collieries. Another example where scientific knowledge will be of the highest use to the engineer is in the application of magnetism and electricity. The recent power which we have gained in the passage of telegraphic communication by the use of electricity may be employed not merely in exploring the deepest mines or in connecting continent with continent, but even in the commonest transactions of life; while, if we turn to chemistry, and only glance at the action of those two great agents, heat and light—the principles of decomposing or of composing, the combinations and the affinity, and atomic proportions of almost every substance in the universe—all of which may occasionally be important to the mining engineer; if again we remember that whether he is examining the mineral, the vegetable, or the animal kingdom, he must refer to chemistry at every turn; that it is by its assistance that in minerals he must detect the characteristic of each specimen, must purify and separate them and prepare them for the use of man; that in vegetables and agricultural produce it is only thus that he can determine their most nutritious qualities, and the soils most favorable to their growth—it will be seen, I venture to think, in these few (and they are a very few) examples which I have set before you, that there is no branch of scientific knowledge, from the most speculative down to the most practical, which may not be of value in the common everyday work of the miner and engineer. And I ask you, once again, whether it is creditable to us in this neighborhood, where not only some of the greatest works—and that means some of the greatest national wealth—in the kingdom, are seen, but where there is equal intelligence to match it, the opportunity of higher education should be denied to many of our young men, that there should be no such thing as a great Mining and Engineering College in the whole northeast of England. A few nights ago, Dr. LYON PLAYFAIR referred to the great educational establishments of the little Canton Zurich as the source of its success; have we not some cause to blush, that with material means enormously greater, our efforts to develop, to give fair play, to the intelligence of our young men, should be almost in an inverse ratio to the advantages with which nature has endowed us? But (2) the argument for a better education is, I conceive, immensely strengthened, if we look at the second class of men to whom I have alluded, and who hold an intermediate position between those of the highest knowledge and those of none at all—the underviewers and overmen, who are numbered at about three thousand, together with about twelve thousand deputies or ordinary overlookers, making altogether some fifteen or sixteen thousand men. Now, what is the present state of these men as regards their education; is this more satisfactory, and, if not, what alteration or improvement does it require? I would rather describe it in the words of some who are well acquainted with it. Mr. LOWTHIAN BELL puts the case clearly and shortly:—"There are two extremes," he says, "the highly educated, and those not educated at all; and we stand very much in want in the North of the means of education for those in the intermediate degree. We have occasion to employ inspectors of mines, and foremen in manufactories, and we neither have the means of educating those men, nor the means of educating managers, strictly so called. The overlookers of our works are almost exclusively men that have been brought from the ranks, men to whom we were compelled to confide the carrying on of our establishments, who in a great measure are destitute of that kind of education which we consider would be a great help to us in carrying on our works. They are entirely self-educated men."

Let me ask, in passing, what would be thought in most professions—in the navy, for example, or in architecture—if the men to whom we are compelled to confide the carrying on of our establishments were entirely self-educated men? The late Mr. N. WOOD states the same fact in a somewhat different form: "The superior managers," he says, "in Yorkshire, Wales, and other places, have lamented very much the state of education of the persons in charge of the management of the mines. There is nothing, perhaps, more important than the ventilation of a coal mine, more especially where much inflammable gas is emitted, and yet very few of the managers of mines in those districts know the principles of ventilation. I have seen some practical examples of that deficiency of the most ludicrous nature; and I believe I speak the opinion of all the managers and mining engineers of the present day, when I say that there is still a lamentable want of education in managers generally of those districts." Mr. WOOD's remarks, it is true, refer principally to the coal mines in Yorkshire and Wales; but he says, speaking generally, "that the education of the lower class of managers of mines does not extend much beyond reading and writing, and the elements of arithmetic. I might accumulate evidence on this point almost indefinitely; but my time is limited, and I will therefore merely add (what in itself speaks volumes) the petition of the miners of Northumberland and Durham, presented to the House of Commons in 1865. What they ask is this: "That all agents, overmen, or chief managers of mines, be subjected to a scientific examination, and that a certificate of competency be given by some qualified person or Board of Examiners, as the House of Commons may appoint, previous to any mine being placed under their charge." Possibly the late successes of Germany may have given us an idea that education has some little practical value, or I should hesitate to add that in Saxony all head officers of mines must attend a higher mining school, and that the subjects of study are, for the higher class, mine surveying and mine book-keeping; for the second class, geography, geology, mining, and elementary mechanics; for the third class, geometry and mineralogy. Drawing is taught in all the classes.

Here, then, sir, is the state of the case which I bring before you, and I repeat, it is not my own statement, but that of the most competent authorities on the subject. They tell us that while the education of the very highest class of miners and engineers is far from perfect, and is hardly to be obtained at all in the North of England, that of a class scarcely second in importance, and to whom the practical management of mines is much trusted, is almost wholly left to chance, and that when they turn out, as they often do, men of great ability, they only do this "by educating themselves." Certainly I am not going to speak against self-taught men, who have often been, like our BRINDLEYS and STEPHENSONS, the highest of all geniuses. But are we required at this time of day to waste our time in refuting the fallacy, that because now and then we get a genius in spite of his want of education, it is therefore better to educate no one. It is not a question about producing an occasional genius like STEPHENSON; it is a question whether the mass of our men of talent shall have their talent cultivated, or shall be left half-ignorant of their work, and therefore dangerous to others. What, then, is the kind of education I propose to give, and where is it to be given? Fortunately the question is not difficult to answer, with regard to the largest class of whom I have spoken. We may have more difficulty in supplying the very highest kind of education. (1.) How can you give the humblest class of miner a better teaching than he has at present? We are now promised a national system of education, and I must repeat the wish expressed on Friday, that it may not be too uniform, but may adapt itself to the differences of our very different classes of population. We ought, for example, to have much teaching of objects in our mining districts. I assert that the humblest boy in a pit village ought to know something about his daily work. Every day he is handling coal, and feeling damp, and breathing gases. It may be said, "There is no time for all this." Well, in the first place, it does not take much time, and in the second, I agree with Professor HUXLEY and Dr. PLAYFAIR, who have expressed the thought in remarkably similar language, that "if he is not snubbed and stunted by being told not to ask foolish questions, there is no limit to the intellectual craving of a young child;" that you poor boy in a pit village is often "a young LINNÆUS roaming over the fields in search of flowers, a young conchologist or mineralogist, gathering his shells by the sea shore."

First, then, your very elementary teaching must be different from what it is in other parts of the country. The next step must be that the cleverer boys in your elementary schools shall be able to advance to a higher education. This, you know, is at present impossible; but it is one of the primary objects of a national education, and is one for which at this moment we have great opportunities. All our middle class endowed schools are about to be remodelled, and one feature in the plan proposed is that there shall be successive grades of schools, so that the cleverer boys from the lower schools shall, by means of scholarships, rise into a higher school. And this I hold to be of vast importance in this part of the country; for nowhere is the actual talent of boys more called out than here. Nowhere does a clever boy learn so much by contact both with man and with nature. No doubt there is a bad and a coarse side in the fact that boys are so early thrown together in their hard pit life; the redeeming feature is, that given a good moral and intellectual training, nowhere do boys so quickly learn to take an interest in the thousand practical and scientific questions which a miner's life suggests. But I must detain you a few minutes longer. For I have not yet said how we are to supply the highest education of our mining and engineering youth. I find a universal agreement as to the want. Almost every thoughtful man whom you have had here, (and forgive me if I say that it is not the men of wealth, but the men of thought who do us real honor) agrees in saying that the higher education of miners and engineers is lamentably defective. Mr. LOWTHIAN BELL, Mr. N. WOOD, Mr. GEORGE ELLIOT, are all as one on this point. They all tell you, if I may use Mr. GEORGE ELLIOT's words, that "the complex duties of your profession, the emergencies certain to arise, in which scientific knowledge is indispensable, make it impossible to ignore the fact that in the competition of the future the uneducated man is sure to be left behind; that there is no branch of physical science but must be useful to them, and that the systematic course of instruction which would naturally grow up might be less elaborate, but should be as practically useful as that given in the schools of Paris and Freiberg. Now, the obvious mean-

ing of these words is, that the North of England ought to possess this course of systematic instruction, and I feel that you ought not to be content till you have set on foot some institution of this kind which will compare with those now founding in other parts of the country. I don't mean a mere system of popular scientific lectures given in the evenings, when the mind is but half itself; these are good things in their way, but it is absurd to call them education. I mean that you ought to have some institution which will lay the groundwork of an accurate scientific education. It is a great work to found such an institution, but it ought not to be a difficult one. At this very time a commission has been appointed, with the object of improving the means of scientific education throughout the kingdom. Now, it is no good speaking vaguely on these points, so I will give you a practical suggestion. If a few of your leading men would throw themselves into the subject, if you would send up a petition from the Town Council, for example, asking that the Commissioners will specially consider the want of an institution of this kind in Newcastle, a great step will be taken; and you may perhaps do something to mitigate the charge which has been lately brought against town councils, that they are the last of all bodies to care for the moral and intellectual cultivation of their fellow-citizens. The University of Durham has, at different times, been desirous both to found for itself, and also to assist Newcastle in founding a school of physical science; and I am convinced, from its close proximity to Newcastle, they might work together on this subject; for you have the Mining Institute close at hand, and I believe Durham and the Mining Institute might set the example of a very high class of lectures on mining subjects. But it is best to speak frankly; and therefore let me impress upon the leading men of Newcastle that nothing can be done if you are apathetic in this matter. This is a delicate point to refer to, but I can hardly think that, either in point of educational interest or educational institutions, Newcastle can as yet compare with the other great towns of the kingdom, with Manchester, Liverpool, Leeds, or Birmingham. We have not, it is true, the advantage of some of their great foundations, Owen's College, at Manchester, for example. But once let us make a beginning, and what has happened elsewhere in England will happen here. We shall rally around us the hearts of those, and they are many, who feel that to awaken the thoughts of men to whom God has given powers of mind, and to enable them to use those powers for the good of their fellow-creatures, and so far His glory, is one of the highest objects which man can pursue.

Central Rail Railways.

On the Application of the Central Rail System to a Railway in Brazil, and to other Mountain Lines; also on the Advantages of Narrow Gauge Railways.

By J. B. FELL.

SINCE the opening of the Mont Cenis Railway in June, 1868, other mountain lines on the centre rail system have been under consideration in different parts of the world. One of these lines now being constructed is in Brazil. It commences at the terminus of the Canta Gallo Railway, crosses the Serra at an elevation of 3,000 feet above the Canta Gallo line, and terminates at the town of Novo Friburgo, a distance of twenty miles. In some of its principal features this railway resembles the summit line of the Mont Cenis, the gradients for the passage of the Serra over a distance of ten miles, being principally from one in twenty to one in twelve, and the curves by which the line winds round the spurs or countersfort of the mountain being for a considerable portion of it, from forty to one hundred metres radius. The narrow gauge of 1.10 metres has also been adopted. In other features, however, there is an important difference between these two centre rail lines. The concession for the Mont Cenis was but temporary, terminating at the completion of the great tunnel, and the railway is laid on the existing public road, whereas the Canta Gallo line will be permanent, and the works will be so constructed as to be specially adapted to its requirements. It will not have to contend with the difficulties of an Alpine climate, and, profiting by the experience of two years' working on the Mont Cenis, it will have the advantage of many improvements which have been made in the engines, carriages, and permanent way during that period. Consequently, the Canta Gallo and other similar lines, now being or about to be commenced, having the interest of marking an important development of the capabilities and advantages of the central rail system, as applied to the construction and working of mountain railways.

It may be useful here to record what has been already accomplished in the task of carrying railways over mountain passes, hitherto inaccessible to the locomotive, and of giving it the power of safely carrying trains of passengers and goods upon gradients and curves which would previously have been considered most perilous, and, indeed, impracticable. The Mont Cenis Railway has now been open for traffic two years and three months, and during that period the trains have run a distance of more than 200,000 miles, have carried between France and Italy over 100,000 passengers without injury to any one of them, and have effected the transport of a considerable quantity of merchandise. Since the month of September last it has carried the accelerated Indian mail, and by the service thus established the delivery of the India mail via Marseilles has been anticipated by the Brindisi and Mont Cenis route by about thirty hours. The ordinary mails between France and Italy have been carried by the Mont Cenis Railway since its opening, and one night of travelling has been cut off the journey between Paris and Turin.

Although the Mont Cenis railway cannot be taken as a type of the best or most approved application of the centre rail system, it has the effect of proving its mechanical practicability and safety when put to the most crucial test to which any new principle could be submitted. There have been mechanical defects in the construction of the engines, which have added unnecessarily to the cost of traction, and these defects can and will be removed in the engines about to be built for the Brazilian and future centre rail lines. The cost of traction, as might be expected under the circumstances, has hitherto been high—about three francs per train kilometre; but there can be no doubt that, with improved engines and good management, the cost of traction may be reduced to one franc fifty cents per train kilometre. The Semmering incline in Austria furnishes an example of the economy that may be effected by improved machinery and management, the cost of locomotive power having been reduced from 2.85 francs in 1860 to 2.15 francs in 1863, 1.70 franc in 1865, and 1.49 franc in 1866. In the four new engines last built for the Mont Cenis railway, a considerable saving has been made in the cost of repairs, by using four cylinders instead of two. By this arrangement, the inside and outside mechanisms are disconnected, and any contention between the two is avoided. The adhesion, however, is not equal to the two cylinder engines, and the power is transmitted from the inside cylinders to the vertical axles by means of a train of toothed wheels. In the new engines for the Canta Gallo line, it is proposed to dispense with the toothed wheels, and substitute for them a system of direct driving by connecting rods. The power of adhesion will also be considerably increased. These new engines will have the advantage of being able to run at a speed of from twenty to thirty miles an hour upon the ordinary gradients of the line, and of taking their loads up the mountain section at a diminished speed of from eight to ten miles an hour.

In an economical point of view, the result of the application of the centre rail system to the Canta Gallo railway will be as follows: The cost of construction, assuming it to be as estimated, about £300,000, would be at least doubled if made on gradients upon which ordinary engines could work. In this case the costs of traction and maintenance for a centre rail line will not be greater than for a line with ordinary gradients passing over the same country. The clear saving, therefore, effected by employing the centre rail system is at least £300,000, and the construction of a valuable line of railway has been rendered possible which would otherwise have been commercially and financially impracticable.

A somewhat similar line of railway is under consideration by the Indian Government, from the port of Karwar to Hooble, in the South Mahratta country, both by way of the Arbyle and the Kyga Ghats. The distance is ninety miles, and it is proposed to employ the centre rail for a length of about ten miles, upon gradients of one in twenty, for the passage of the Ghat, by which a saving would be effected of about £500,000. The cost at the present time of the transport of cotton and other produce over the ninety miles is stated to be £235,000 per annum, and there is, in addition, the disadvantage of not being able to convey the whole crop to the port of shipment before the rainy season sets in; a large portion of it has consequently to be housed and kept until that is over.

Negotiations are going on with the Government local authorities and people interested for the construction of centre-rail lines in Italy from the Adriatic to Macerata, and crossing the Appennines to Foligno from Florence to Faenza, and for three branch railways in the Neapolitan States; in France, from Chamberry to St. Andre du Gaz and Lyons direct, crossing the Col de l'Epine; in Switzerland, for the passage of the Simplon; and in Spain, for lines from Leon to Corunna and Gion. The concession for the Mont Cenis Railway expires on the opening of the tunnel line, and when that period arrives it has been proposed to remove it to one of the neighboring mountain passes, where it would have a permanent life. At the time the concessions were granted it was considered that the line would be worked for ten, or at least, seven years; the progress of the great tunnel has, however, been so much accelerated that it is stated the tunnel line may possibly be opened for traffic by the end of 1871. In that case, and taking into account the difficulties of all kinds with which the enterprise has had to contend, the Mont Cenis Railway can only be regarded as an experimental line, and the pioneer of a system destined to confer the benefits of cheap and safe communication between many countries separated by mountain ranges hitherto impassable by railways and locomotive engines, and the promoters must look to the future for the reward of their labor and the anxieties of the past.

Drawings were exhibited of a system of narrow gauge or suspension railways, an example of which has recently been constructed as a branch line for carrying iron ore from the Park-house Mines to the Furnace Railway in North Lancashire. The gauge of this line is eight inches, and the length about one mile. It is carried at various elevations, from three to twenty feet, over an undulating country, passing over the fences, roads, and water-courses, without requiring the construction of earthworks or masonry. The structure consists of a double beam of wood, supported at intervals on a single row of pillars. The narrow gauge is practically made equivalent to a broader one by the steadying power of guide-rails fixed on the sides of the beam and below the carrying rails. The bodies of the wagons are suspended from the axles, and by this means the centre of gravity is brought low. They are also furnished with horizontal wheels which run upon the guide bars, and thus maintain the equilibrium of the carriages, and render it almost impossible for them to leave the rails. The Park-house line will have a traffic of 50,000 tons per annum. The cost has been £1,000 per mile, without stations or rolling stock. It is worked by a stationary engine and endless wire rope. The saving effected in the cost of transport will be at least 6d. per ton upon the distance of one mile.

In Switzerland application has been made to the Government of the Canton Vaud for a passenger line on this principle from the town of Lausanne to the Lake of Geneva. Plans have also been laid before the War Office for accelerating military transport in foreign countries, and before the Governor-General of India for the construction of cheap branches from the trunk lines in that country. The gauge of these railways may be from six inches to eighteen inches. They may be made of wood or iron, or of the two combined, and may be worked by either stationary engines or by locomotives of a form specially designed for the purpose. They have the advantage of being economical in both construction and working, they occupy but little land and cause no severance, they may be erected with great rapidity, and being portable, may be removed when no longer required, and re-erected in another locality. Before the war commenced an offer was made to the French Government to construct one of these portable railways to supply their army with from 1,000 to 3,000 tons of ammunition and provisions per day. The work would have been undertaken by a gentleman in Paris, who, with a force of 2,500 men, would have constructed from four to five miles of railway per day, following the advance of the army into Germany. The result has, however, shown how little such a provision was needed.

Polytechnic Club of the American Institute.

Meeting held at the rooms of the Association, Oct. 15, 1870. Prof. S. D. TILLMAN in the chair. First meeting after the summer vacation.

THE meeting was opened by the reading of the following items of scientific news by the President:

HYDRATE OF CHLORAL.—Recent medical journals report favorably on the use of hydrate of chloral for the purpose of allaying brain excitement and producing sleep. It induces sleep with more certainty than opium, and without the injurious effects resulting from the latter. It has no curative properties, but on account of its quieting influence it has been called the king of narcotics.

Dr. FEUCHTWANGER remarked that there was a limit to the dose of both hydrate of chloral and opium. He said that very large doses of the former had already been reached.

PHOTOGRAPHING THE SUN.—Professor WINLOCK is now engaged in taking pictures of the sun on a somewhat novel plan. He uses a single lens object-glass, 4¼ inches in diameter, having a focal length of 40 inches, made by CLARK, of crown glass, and corrected for spherical aberration by means of an artificial star. The tube of the telescope points to the north, and the image of the sun is thrown in by means of a plate-glass reflector. This glass in not roughened or blackened on one side, because when that was done the heat of the sun distorted the plane surface. The slit is at the object-glass end of the telescope, so that when it is thrown across no dust is shaken on the plate, as frequently is the case in the usual way of working.

The President remarked that Prof. WINLOCK was to go to Sicily with the expedition sent by the United States government, to observe the eclipse next December. Mr. CHAPMAN, a member of the Institute well-known as a stellar photographer, goes with him.

ON THE BREADTH OF THE SPECTRAL BANDS.—LIPPICH has given in POGGENDORFF'S *Annalen*, an explanation of the broadening and other variations of the spectral lines of luminous gases, which he ascribes to changes in temperature. The law he claims to have discovered is that the ratio of the difference of the wave-lengths which correspond to the borders of any spectral band to the mean wave-lengths of such band is constant in the same gas, but in different gases the ratio is directly as the square roots of absolute temperature, and inversely as the square roots of their densities.

AMORPHOUS SILICA FOR FIXING PIGMENTS.—Dr. M. REIMANN describes, in *Dingler's Polytechnic Journal*, a series of experiments made with the view to apply amorphous silica for absorbing the solutions of fuchine, analine blue, etc., and to use the colored powder so prepared as a pigment for various materials. The silica is prepared by precipitating a solution of water-glass (silicate of soda or potash) with an acid, and collecting, washing, and drying the precipitate in the ordinary way. Grass, first superficially acted upon by hydrofluoric acid, and next mordanted, as is usual for cotton, assumes, when submitted to the processes in use for dyeing fibre similar colors precisely as that fibre; the author states that this effect is caused by the amorphous silica contained in the glass and made effective by the hydrofluoric acid.

AQUARIUMS.—The greenness of the water in an aquarium (says *The English Mechanic*) depends upon the amount of light admitted to it. The greenness consists of an immense number of microscopic plants produced from germs contained in water, or supplied to it from the atmosphere. Strong, bright light tends to develop these. The cure consists in removing or modifying the cause. Either put the aquarium in a shadier place, or, during the hours when the light is most intense, cover it with a sheet of light-blue tissue paper. At any rate, the light must be lessened, then the greenness will gradually disappear. The best vegetation for an aquarium is the green film which covers the stones or rock-work of either salt or fresh water aquariums. After they have been some time in operation these can be made to grow freely or otherwise by the means indicated above. Pond, river, or marine plants of the higher order seldom do any good. Exception must be taken, however, to valisneria spiralis, a grass-like plant which grows freely in fresh water aquariums, is very ornamental, and gives out a good supply of oxygen.

ENGINEERING DIFFICULTIES.—Natural phenomena, says the London journal *Nature*, must be regarded by the engineer in the tropics. Here the boring worm will teach him salutary caution. In the East we have seen a railway train stopped on an incline by locusts. The locusts have a fancy for sitting on the rails, and when the engine-wheel touches them they are crushed, leaving the rail so oily that the wheel slips. On one line, in the locust season, sand-boxes are used with the locomotive. Oysters are, however, a new recorded enemy to the engineer. Some gourmand suggested to the Madras Government, doubtless appreciative of the value of oysters for eating or for pearls, turned a deaf ear to remonstrance. Time has, however, justified the remonstrants, for, though projectors have got an abundant supply of oysters, the harbor of Tuticorin is now said to be in danger of total destruction by the growth of the oyster beds, and the attention of the Government seriously directed to cross the love of oysters. The Madras coast is so ill-provided that harbors are more valuable than oysters, and a campaign will be directed against the latter, although the revenue authorities hanker after the taxes on the pearl fishery.

IMPROVED SPECTROSCOPE PRISMS.—Prof. WALCOTT GIBBS, of Harvard College, has experimented with various liquids as substitutes for bisulphide of carbon, now used for filling hollow glass prisms of 60°. Bisulphide of carbon is clear colorless, and unites a moderately high mean refracture to a very high dispersive power, but it is very volatile, quite sensitive, optically, to changes of temperature, and has an offensive odor. A solution of phosphorus in bisulphide of carbon has a dispersive power 50 per cent. greater than that of the bisulphide alone, but it becomes turbid on exposure to sunlight from the formation of amorphous phosphorus. It occurred to Prof. GIBBS that the formation of the amorphous phosphorus might be prevented by dissolving sulphur with the phosphorus, and experiment proved the correctness of the conclusion. His practice is to dissolve one part of dry flowers of sulphur and two parts of phosphorus in four or five parts of bisulphide of carbon, and to filter the liquid through a well dried ribbed paper. This solution gives a spectrum perfectly clear, but owing to its yellow color there is a marked absorption at the violet end of the spectrum. The disadvantage in using it arises from the danger of breaking a prism, for the liquid takes fire spontaneously when brought in contact for a few seconds with any porous material like wood or paper.

Mr. FISHER remarked that at the West there was often great trouble from locusts on the track greasing the rails to such an extent that recourse must be had to the sand-box. The Presi-

dent remarked that J. L. MOTT, late member of the American Institute, took out a patent for sand-boxes on locomotives, some thirty or more years ago. It was then remarked by a member, that on some parts of the Naugatuck Railroad fallen leaves were often a source of great annoyance. They accumulate upon the track and stop the engines; in this case sand would do no good as a remedy.

A TALKING MACHINE.—For some time past (says *The Observer*) the London public have been informed that mechanism and invention have at last accomplished a task which has been unsuccessfully attempted by men of science in different countries for many years. We refer to the Talking Machine of Prof. FABER, which has been exhibited on the Continent with great success, and is now to be seen in London. It certainly sustains in every way the qualities its inventor claims for it, as it not only distinctly articulates in English, French and German, but laughs and hisses in the most approved fashion. The structure of the speaking apparatus, and the *bona fide* character of the results, are such as to remove the doubts of the most skeptical on these points. The machine consists of a bellows, supplied with wind by a pedal, worked by a lady, who also manipulates certain notes, through whose agency the sounds are produced, which form the attractions of the work. These sounds are emitted by means of a mask, resembling the human mouth, with lips, tongue and throat complete; and in articulating letters and syllables the movements of these organs of speech correspond with those of the human subject. Without going further into detail, the principal upon which the instrument is constructed will be manifest, and great credit is certainly due to the invention of so delicate and astonishing an instrument. Upon the principle of the apparatus now exhibiting, others, of course, could be constructed, and although the results obtained by the one at present in use are satisfactory, yet tone and force in an increased degree could be obtained from one on a larger scale.

Dr. PARMLEE wanted this item stricken from the proceedings of the Institute, and stated as a reason, that some years ago there was a speaking-machine invented in this city, in 1857 he thought. It could prononnce some words, give the sounds of the letters, and even got as far as dissylables, but with difficulty. It was so arranged that the whole interior seemed transparent, and could be seen. But the truth was, that the apparent transparency was secured by an arrangement of mirrors, leaving space enough to conceal a large man, who was *the* machine and did the talking. There was every probability that the London machine was built in the same way, and that some human machine did the talking. The President remarked that the item was selected with a view of bringing out a discussion of this kind.

Mr. CHARLES B. BOYD then took the stand, and described a telescope of his, consisting of a plane speculum, having an equatorial motion, which reflected the object to a concave speculum at a distance, which in turn reflects the image to the eye-piece situated behind the plane mirror; a hole in the centre of the latter allowed this to be done. This arrangement, an invention of Mr. BOYD'S, brings the mirror and eye-piece near the observer, while at the same time it enables one to have a very long telescope 500 or 1,000 feet, without any great extra expense for an observatory, combining, in fact, both observatory and telescope in one construction. A thirty-foot telescope needs an observatory that will cost $50,000; while in this arrangement the observatory proper needs only be sufficient to cover the equatorial.

Dr. PARMLEE said there was one item of scientific interest that might be new to the club, and one of great interest, and that was the making of all the military stations of the United States meteorological stations, from which reports of the weather were to be telegraphed. This was of vast importance. Had the people of Virginia known only a few hours before that flood was to be expected, they could have been so well pre- red that the loss would have been small.

Prof. WHITNEY then read a very interesting paper upon the Almaden cinnabar mine in California. There are but large mines in the world: Almaden, in Spain, with ore ng ten per cent; Idria, in Austria, and the New Almaden fornia. At first, this ore yielded about thirty-six per the metal, but it has now fallen off to about eight per t was first known to the whites in 1845, and in 1850 a was formed to work it. Excavation now goes on at f 1,000 feet per month. The production is about ts, weighing 65 pounds each. A combination among prevents a production above a certain amount, so e may always be kept up.

ITWANGER remarked that the description was very eed, he had himself spent a day at the mine, k from experience. He said that at Napa there nabar mine, producing about 15,000 flasks.

Dr. PARMLEE t[hen] gave an account of his method of depositing a coating of silver or other metal on the inner other pipe. After detailing the difficulties in he said the ordinary manner was to fill the n and insert a copper wire, treating the 'd be treated when it was desired to coat rotype process. For various reasons, xperiments which were made before was reached, were detailed. The nly a portion of the tube with m and cyanide of silver, and ion pass a bar of silver which The pipe was laid at a slight etween two rubber pistons owly drawn from one end travelling anode which sulated wire. By this en to the whole in- hown. The ex- were about two cents in the same to silver of the He

The discussion then turned upon lead poisoning, and several strong points were brought out. Lead is an accumulative poison. What is taken in a week or a month does not injure, perhaps, but once taken, remains to be added to whatever may come afterwards. To this cause the great increase of nervous and rheumatic troubles of late years was attributed. A discussion between two physicians was cited, in which the fact of this increase was acknowledged. It was all, however, referrable to the use of lead pipe, by means of which a great deal of lead poisoning is accomplished.

Machinery Oils.

THE adulteration and mixing of oils for lubricating purposes has become so common, that it is difficult to obtain a really good lubricator, especially in localities remote from the large markets. In many of the mining districts of the territories a want of a reliable lubricator, for mining machinery, has long caused serious inconvenience. For this kind of machinery no oil is better adapted than good sperm. There are other kinds of oil that may answer the purpose, that can be obtained at a cheaper rate, but we doubt whether any other kind is cheaper in the end. There are several reliable and responsible manufacturers and dealers in oils in this city, where consumers or middle-men can have their orders honestly filled. Among these we may mention Messrs. MILLIKEN & Co., of No. 139 Maiden lane, New York, who are extensive manufacturers and dealers in these oils. We refer our readers to their advertisement in another column.

The American Institute of Architects.

THE annual exhibition of this chapter of the Institute was held on Tuesday last, October 18th, at their rooms, No. 925 Broadway. A number of handsome drawings and photographs of buildings were exhibited, the greater portion of which have been erected during the past year by members of the Institute. The meeting was very informal, and the merits of different designs were discussed by the older members, around whom little groups of younger men gathered to listen, and without doubt received from this peripatetic discourse many valuable hints. The greater portion of the designs were so meritorious that it would appear invidious to select any for special comments. Later in the evening a collation was partaken of, and everybody went home well satisfied with the entertainment of the evening.

PACIFIC COAST MINING REVIEW.

[From the San Francisco Commercial Herald, Oct. 7.]

In our last Quarterly Review we were led to remark upon the then obvious abatement of the speculative spirit in mining matters, and the disposition evinced to make this a safe and practical, instead of a visionary and hazardous pursuit. Since that time this tendency has become still more manifest, justifying the hope that the prosecution of this business will give better results in the future than have heretofore attended it. Never since vein-mining has been extensively engaged in upon this coast have there been so few failures to record in this department of the business as of late, scarcely a single one of note having occurred within the past six months. We have arrived at a stage in this pursuit where, if all are not realizing large gains, very few are suffering loss, a condition of things that, in view of our past experience, may justly be claimed as an important advance made in the right direction. In embarking in a new mining enterprise, the capitalist no longer exposes himself, as heretofore, to almost certain loss, while a much smaller proportion of our mining population is now idle than is usually the case. Unable longer to obtain capital with wonted facility, men are finding means for setting themselves to work, and almost everywhere a moderate degree of success has been the result. It is astonishing the ingenuity and fertility of resource evinced by men thrown wholly on their own means. Where they cannot get money to aid them, they employ their own muscle for opening their mines. When it is impossible to procure mills, the arastra or hand mortar is resorted to for crushing the rock, and where regularly constructed works cannot be had, they improvise rude furnaces for smelting their ores. In this manner there is a vast amount being done in a small way, insuring a good degree of prosperity throughout the mining communities. From observations made during a recent trip through the mineral regions of central California, Utah, Idaho, and Nevada, as well as from information derived through other sources, we are satisfied that the business of mining is now paying more universally and steadily, and affording more general satisfaction to those engaged in it, than ever before; nor has the future of this calling at any previous time seemed so full of encouragement and promise.

It is true, there is not now so much money being made through speculative operations, nor are the wages of labor or the general earnings of the mining community so large as they were some years ago. But then fewer persons are now losers through the purchase of worthless properties and ill-advised undertakings, while the masses are much more generally and steadily employed, their gains, from uninterrupted work, more than requiting them for the loss sustained through a slight reduction of wages. In fact, there can be no question but what this pursuit, through the recent application of certain much-needed correctives, is now rewarding both labor and capital more surely and constantly, if not more liberally, than at any former period.

Besides the foregoing, other very radical and salutary changes have lately been effected in the business of mining for the precious metals, almost revolutionizing it so far as efficiency and economy of administration is concerned. Close and calculating thrift has in a good degree taken the place of loose estimates and reckless expenditure, while caution and good judgment have largely superseded carelessness and incompetency. In the selection of employees and agents, more regard is being had to qualification, integrity and fitness, than to considerations of favor or known subserviency to certain cliques and interests.

There has also transpired during the past few months, an almost total breaking up and abandonment of those hurtful combinations entered into for maintaining the prices of labor at fixed and extortionate rates, and otherwise unduly interfering with the rights of both master and workmen. With their cessation employers, discarding the rule of uniform prices, are beginning to adopt the plan of paying their hands according to merit and the value of their services; under which just and sensible method both parties are found to be benefitted—the proprietor getting a fair equivalent for money paid out, while the faithful and competent workman enjoys the advantages that should by right accrue to him.

It has further resulted from the discontinuance of these mischievous associations, that proprietors and capitalists, relieved from the tyranny of the turbulent and exacting, and assured of a better supply of steady and reliable labor, have been encouraged to undertake many enterprises and improvements that otherwise would not have been entered upon, thereby greatly increasing both the immediate and the prospective demand for labor. In consequence of this and other favoring circumstances, the past summer has witnessed the resumption of work in many districts, where operations, owing to partial or entire failure, had been suspended, and the starting up of mills and reduction works that had long been idle. All over the country examples of this kind present themselves, denoting a general revival of confidence in mining pursuits, and arguing for them a great future activity and success. If we except such as are too imperfect to do good work, there are comparatively few unemployed mills in the country at present; many that had been neglected having been repaired and started up, while others, originally erected in unfavorable localities, have been taken down and removed elsewhere.

As cases in point, we may instance the revival of work and the starting up of mills in the Meadow Lake District, for years nearly abandoned, and in the Clear Creek and the Owen's River countries, in this State, as well also as in the Humboldt, Esmeralda, Reese River and Silver Bend regions, and many other minor localities in the State of Nevada, not to cite a multitude of similar examples occurring both in California and the outlying Territories.

In the Clear Creek section several mills, after standing still for a long time, have again commenced running; the great obstacle to success in that district—the difficulty in managing the highly sulphuretted ores—having been measurably overcome. The mines of Inyo County, after grievously disappointing those who invested in them years ago, are at last beginning to yield profusely, tons of coarse bullion being shipped daily from that section to San Francisco; and from the substantial evidences of wealth they are now evincing, there is reason to believe that these mines will yet justify much of the confidence reposed in them at an early day.

Throughout the State of Nevada, and all parts of the Utah Great Basin and the Territories bordering upon it, the resuscitation of these suspended or partially paralyzed industries has been even more marked than in this State; some districts in that quarter, from the most abject prostration, having been within a very short time advanced to a condition of general prosperity. Passing by the older, more extensively developed, and steadily paying mines of Washoe, which have been yielding largely in the aggregate the past quarter, we find that a very decided impetus has lately been given to mining in the Humboldt region, which, after a fruitless waste of millions upon it, is now beginning to show signs of a new and better vitality, sending out monthly very handsome shipments of bullion. The revival of this industry here, where all had for years been nothing but an industrial desolation, is largely due to the persevering and well directed efforts of a single individual, JOHN C. FALL, who, with but limited means at his command, and in the face of great difficulties, has succeeded in thoroughly opening several mines and in putting up two substantial mills in the district, both of which have been kept running without interruption and with excellent results from the day of their completion to the present time. This experiment of Mr. FALL having demonstrated that the cause of failure lay in the men and not in the mines, other parties have since been encouraged to commence operations in this district, which is likely soon to emerge from the cloud that has so long darkened its prospects.

In Esmeralda, another disastrous field of mining operations, affairs have also taken a turn and are slowly coming up; this district, like Humboldt, having lately enjoyed the advantages of a more judicious and systematic application of labor, besides the aid of additional capital; A. K. P. Harmon, and a number of other energetic and capable business men, of San Francisco, having interested themselves in the district, with a view to a re-opening of some of the long-neglected mines and starting up several of the mills, which have for years been suffered to remain idle. That these laudable efforts, already meeting with liberal reward, will ultimately lead to a great success, admits of no doubt, the abundant wealth of these mines having been already demonstrated; the general failure heretofore met with, having, as at Humboldt, resulted chiefly from inexperience and mismangement.

Nowhere have early expectations encountered more general and signal disappointment than in the Reese River country; and yet, even this graveyard of former hopes affords signs of a coming resurrection. The only mill now running at Austin is turning out every day an amount of bullion valued at $5,000—its net annual earnings being over half a million—more than two hundred per cent. on the investment. The success of this mill has been such as to lead to the repairing of several of the dilapidated establishments in and about that town, with a view to running them on the fine ores, which further and more thorough exploration has shown to be abundant in the neighborhood.

In the Cortena, Twin River, Silver Bend, Hot Creek, Reveille, Pahranegat, and several other districts in Nevada, we find similar examples of enterprise sthat, having succumbed after a short struggle, have recently, with cheapened labor, improved knowledge, and better general management, been recuscitated, and are now in a fair way not only to retrieve former losses, but yield large revenues.

As instances of marked success in recent mining and milling operations a few only can be cited. Omitting the well-known and oft-quoted cases occurring on the Comstock lode and several of the California quartz-mines, some of which show a larger gross product than ever before, we find the earnings of the Stanford mill, in the White Pine district, running upon ore from the South Aurora mine, alone, having averaged the past summer about $60,000 per month; a sum that might be doubled, and even quadrupled, with an equivalent increase of mill-power, so enormous are the reserves in this mine; and it is really the case that the claims being opened in this vicinity are, as a general thing, likely to pass the ordeal of deep exploration in the most triumphant manner. There has at no time been any question as to the richness of the surface deposits at White Pine, though, owing to certain eccentricities that characterized them, there was some uneasiness felt at first in regard to the probabilities of their continuity at greater depths. This problem has been pretty satisfactorily settled by the exploratory work already prosecuted on the South Aurora, Hidden Treasure, Eberhardt, Consolidated Aurora, and other leading mines on Treasure Hill, all of which exhibit conclusive evidence of permanency, and some of them also of enormous wealth in their lower levels. Never did the South Aurora present such an encouraging aspect as at the present, a heavy body of ore—much of it assaying over $1,000 to the ton—having been uncovered to a depth of more than one hundred feet, in what

is known as the Autumn Shaft. This ore is so valuable that it is sacked up before being removed from the mine. The Sanford mill is now running with great success, not only turning out large amounts of bullion, but working the ore with greater closeness than ever before, late workings showing a loss of but 14¼ per cent. on pulp assays, more than 3,000 tons having been milled with this result.

The Eberhardt mine, lately transferred, together with a controlling interest in the Consolidated Aurora, to a wealthy English company, seems to be renewing its productive energies, much of the ore now being raised from it assaying from two to seven hundred dollars per ton; and there is little doubt but both this and the Aurora will soon be yielding their former princely revenues. The large and well-appointed mill of the Meadow Valley Company, Ely District, which started up about the middle of July, has been running without cessation since, with results not exactly ascertained, but understood to be extremely large. From Cortez, Twin River, Belmont, Reveille, Kearsage, and Pahranagat, all once defaulting districts, such amounts of bullion are now being sent as must soon reverse the popular judgment entered against them. At Reno the Auburn mill, upon which and its accompanying properties, an English company sunk over half a million of dollars, is now, after standing idle for a number of years, operating with splendid results; its success being due in part to superior management; and in part to the employment of the Stetefeldt furnace in roasting the ores. To the use of this furnace much of the success achieved by the Manhattan mill at Austin may also be attributed, this invention constituting one of the most valuable improvements yet introduced for the treatment of our more rebellious silver ores. With its aid the most troublesome elements can readily be disposed of, rendering all, but the galena ores, which necessarily require smelting, thoroughly tractable. Through the employment of Paul's electric process, a number of mills throughout the country have also been enabled to achieve great gains over former methods of ore treatment, thus promising, as it becomes more extensively introduced, a resuscitation of operations on many of our now languishing or abandoned mines.

A number of important sales of mines have been effected during the past quarter to European capitalists. As a general thing these have been properties already proven and rendered to some extent productive. Among the leading transactions of this kind is the sale and transfer of the Sierra Buttes mine and mill, in Sierra county, the North Star mine and mill at Grass Valley, Nevada county, and the well-known Eberhardt and Consolidated Aurora mines at White Pine, all disposed of to English companies; with the more recent reported sale, also to parties in England, of the celebrated Monarch mine, on the Atlanta Lode, in the Territory of Idaho. These are all mining estates of immense and well-ascertained value, which have been yielding to former owners large returns and handsome profits, even, in some cases, under a very feeble and inefficient management. This has been especially the case with the Monarch mine, which, with its wonderful capacities, its valuable water power, lands, mills, roads and other appurtenances, constitutes one of the most magnificent properties on this coast. It is gratifying to know that foreign capitalists, after the losses they have sustained through former investments in our mines, are at length getting hold of properties that will enable them to retrieve these disasters. It is, moreover, not less fortunate for us than for them that such is the case, as their present good luck will be likely to secure to us further aid from that quarter, and a continuation of that assistance which we so much need. With us the observance of fair and liberal dealings with strangers is now an important necessity. It is exceedingly important to our people that they should act honestly in the present juncture; and it is matter for congratulation that our mining interests are being represented abroad by men of such long experience, safe judgment and real worth as Davidson, Mattingly and a few others, who have lately proceeded to England for the purpose of negotiating the sale of mines or otherwise inducing foreign capital to come to our relief.

With an absence of any special excitement, the past summer has been one of active exploration, several large expeditions and numerous smaller parties having proceeded on prospecting tours into different parts of the country. While some of these enterprises have resulted in partial or entire failure, others have been attended with signal success. The expedition fitted out early in the season at Cheyenne, for exploring the Big Horn country, after many vexatious delays, having finally gotten off, proceeded to the theatre of expected discoveries, but finally disbanded, having accomplished nothing. The rumored finding of rich placers in the Peace River region, British Columbia, circulated during the spring, proved in the end to have little or no foundation; having, meantime, failed of their aim—the encouraging of emigration towards that quarter. Upon Snake River some six or eight hundred miners were gathered during the summer by the reported existence of paying diggings on that stream, where a considerable extent of three or four dollar bar washings do really exist. In San Diego county an extended and promising quartz district has lately been found; which, with important placers, also of recent discovery, at San Rafael, in the adjacent province of Lower California, and but a short distance from the city of San Diego, must contribute largely towards the trade of that port, whence these mines must derive the chief part of their supplies.

The "Burro" mines recently discovered on the confines of New Mexico through the agency of parties outfitted by HARPENDING and ROBERTS, of this city, are now being vigorously developed, and promise to realize the first reports of their extraordinary richness. Additional discoveries of value have since been made in the vicinity, and there is no doubt but this will become a most important mining centre on the construction of the railrord through that region, an event likely to be speedily consummated.

The mines in the Yellow Pine and Clark districts, on the borders of California and Nevada, also discoveries of recent date, are beginning to attract attention, both on account of the free shipments of high grade ores being made from them, and the enormous extent, richness and varied character of the deposits. The owners of these mines have organized under the name of the Piute Company, with a capital stock of $5,000,000—a large but not an excessive sum, for never before in the history of mining have such vast and diversified values been aggregated in the hands of a single company, or one more likely to make them practically available. The virtual possessors of two entire and very extensive districts, supplied by nature with nearly everything requisite to success, owning over a hundred mines of ascertained value, with the chance of finding others on further exploration; with wood and agricultural lands, town and mill sites, springs, water privileges and other franchises, this company have acquired a property surpassing in value anything concentrated in the hands of any one corporation or individual on this coast. With an easy exchequer, a liberal but prudent directory, and a most competent supervising agent in San Francisco to back a thoroughly capable and energetic management in the field of actual operations, no enterprise in the country has ever had the benefit of a better administration than the Piute Company, nor may we from any other justly look for grander or more satisfactory results than from this.

The business of mining, beneficiating or otherwise disposing of our argentiferous galena and other smelting ores, has undergone a marked expansion during the quarter under review, a decided impulse having been given to it through cheapened transportation from the interior by means of railroad carriage, and the ready market existing in this city for these ores at full and satisfactory prices, as well also as by reason of increased facilities afforded here for their thorough and economical treatment. It has now been fully demonstrated by numerous practical trials made the past summer, that the miner can dispose of this class of ores to better advantage in San Francisco than in any other part of the world, whether he desires to sell them outright or have them worked on his own account.

In the first place, the cost of transportation to this city is much less than to Eastern smelting works and markets, while the prices paid for the ores and crude bullion, and the charges made for smelting, are about the same here as there. Then, returns are had from shipments to this point in much less time, the difference being fully one-half in favor of San Francisco. We find upon careful inquiry, and examination into this matter, that very strong inducements exist here for mining communities to send their ores to this point, whatever disposition they may desire to make of them. Where the object is to sell, this city offers as strong a competitive market as any other on the continent, there being numerous buyers in the field ready to purchase on a fair sampling of the ores being made. We have here one of the most complete and well-conducted smelting and refining establishments in the country, nor is it inferior to any other, in point of capacity. We allude, of course, to the extensive works of THOMAS H. SELBY & Co., situate at Black Point, in the northwestern part of the city. These parties, who are eminently well known for their fair and upright dealings, offer, as may be seen by consulting their printed schedules, the most liberal terms for smelting ores and base bullion, the extent and perfection of their works and the facilities they possess for utilizing and otherwise disposing of these metals, justifying their payment of extreme prices for the crude material.

The gain accruing from the shipment of ores to San Francisco, instead of sending them to the Atlantic seaboard, is amply illustrated by the following simple statement: Assuming Elko, from its central position with reference to our base metal mines, to be the point of shipment, we find that it costs $54 to carry a ton of ore from that place to New York, while the cost of its carriage to this city is but $22, a difference in our favor of more than $300 on a single car load of ore, with a corresponding gain in the matter of time, interest, etc. Owing to this difference in freights and other circumstances operating in favor of San Francisco, it has happened that while several considerable lots of ore sent from points even so far east as Central Utah, to the smelting works of Newark, New Jersey, barely covered the costs of extraction, carriage, and reduction, like parcels, consigned to the Selby works, in this city, netted the owners handsome, and in some cases, quite large profits. The proprietors of these works, being possessed of abundant means for taking all the ores that may offer, as well as for enlarging their already ample establishment as occasion may require, the mining community have every assurance of ready accommodation as well as of just and courteous treatment at their hands; wherefore it may be concluded that the bulk of our smelting ores and silver-lead bullion will continue, as heretofore, to find its way to this city; more especially as the majority of our interior mining and trading population have their homes and interests in California!

The quantity of argentiferous galena and other silver and lead-bearing ores now being raised in our various mining districts is large and rapidly on the increase. A good deal of it is being smelted on the ground, the points of greatest production being White Pine, Aureka, and the Cerro Gordo districts, and several localities in the vicinity of Salt Lake; the increase of silver from this source being so large that it will tell materially on our product of bullion the current year, which, much as it may surprise those not posted in these matters, promises to equal, if it does not exceed that of any former year.

MINING SUMMARY.

California.

OIL WELLS IN SANTA CRUZ COUNTY.

The Santa Cruz *Sentinel* says:—"R. R. WHITSIDE has a well on his ranch which is yielding from 80 to 100 gallons per day. He tunneled into the mountain about 30 feet, where he struck the main vein. The oil bubbles up like boiling soap, emitting large quantities of gas, which is sometimes so offensive as to make it difficult for the men to work. The well is about 300 yards from CHASE'S mill, on the Soquel Augmentation, and about half a mile from where Mr. BURRELL bored a well about five years ago. This oil vein extends from Corralitos to Pescadero, and only needs capital to develop it, and receive rich returns as a reward for the labor. But we cannot expect to do much in the way of developing the vast resources of wealth which abound in our mountain range, until we bring ourselves into rapid means of communication with San Francisco."

GRAVEL MINING IN NEVADA COUNTY.

The Grass Valley *Union* has the subjoined:—"Grass Valley district, as we have frequently shown, is the best quartz mining one in the world. It has been supremely successful in taking gold out of quartz and failures to make ledges pay as permanent mines, are exceptions and not rules. Even those which are suspended now, as to work upon them, await better circumstances, when they will be made to give employment to men and profits to owners, as a quartz mining district success is assured at Grass Valley. Of late we have had an awakening in gravel mining. The splendid success of the Hope Company has caused attention to be turned to our ancient river beds, hidden in our mines and rich in gold. Randolph Hill, or Alta Hill (for these names are applied to different parts of the same contiguous ridge), is now being worked systematically and scientifically, from one end to the other, a distance of about four miles, and with the most flattering prospects of success. A number of "diggings," to be worked by the hydraulic process, as well as by drifting and raising gravel to the surface to be washed, will soon be opened. The claims located at the western point of the hill, on the north side of it, are those of MCSORLDY & Co., and on the south side of the hill are the claims of GILHAM, MACAULEY & Co. Both sets of claims have been strongly prospected, and are known to be rich. Coming east from these claims we find H. Q. and E. W. ROBERTS on the north side of the hill, and FRANK TORPEY & Co. on the south side. Both companies have done a large amount of work, and both have found good gravel. Still further east, on the north side of the hill, are WEBSTER & Co., the Picayune Co., COOMBS, GRANT & Co., and the Mammoth Co. On the south side are HAYES, JOHNSTON & Co. These last-named parties adjoin the Hope Co.'s ground and the ground of the BROWN BROTHERS on Squirrel Creek. At the east end of the ridge we can see that the gravel is rich, for BROWN BROTHERS and the Hope have already opened a splendid channel. On the west end of the ridge MCSORLEY & Co. demonstrate that a good lead exists. Between the two points prospectors show that an old river bed is in the ridge, and that the gravel thereof contains gold. WEBSTER & Co.'s prospects are very good, and that state of affairs in their ground settles the matter of the value of the middle part of the hill. Extensive gravel mines will be opened between Grass Valley and Rough and Ready. East Grass Valley is also an extensive deposit of gold bearing gravel. The Town Talk mine, on the south bank of Wolf Creek, has proved a success, although it is scarcely touched. The lead is there of washed gold. The Independence ground, adjoining the Town Talk, is no less valuable. Buena Vista slide, and the hills by the slide, are showing to be rich in gold. Between Grass Valley and Nevada City it will soon be demonstrated that the ridge has under it gravel which is more or less rich in gold. In this extensive gravel region prospectors are busy, and we believe that Grass Valley is soon to be noted for its gravel mines, as it has been for years past for the successful working of quartz.

THE FIRE AT THE EMPIRE MINE.

A correspondent writing from Grass Valley, Oct. 9, says, in relation to the recent destruction by fire of the Empire Mill:

"OFFICE EMPIRE MINE, GRASS VALLEY, Oct. 9, 1870.

"HON. R. W. RAYMOND, COMMISSIONER MINING STATISTICS:

"Dear Sir—You have seen by the telegraphic reports that Ophin Hill has been swept by fire clean—mill, hoisting and pumping works, about 2,500 cords wood and $6,000 worth winter supplies, candles, powder, etc. To-morrow we make a start to rebuild, and hope to have the pump running by Nov. 1st. In regard to the developments in the mine of late the correspondent says: "The property changed hands, and Mr. NESMITT took charge April 16; since then he had opened it up and discovered an under ledge, lying from a few inches to twenty feet back of the old washings, from the tenth level up to the seventh, and from all appearances it will extend up as far as the fourth. It is extra rock, in tenth, ninth, eighth and seventh levels, where he has found it good, from $35 to $40 per ton. He has also made many changes in working, and was mining to an extent of 600 tons per month, with sixty hands in all, and as soon as rains came would have mined and worked 1,000 tons per month, with not over eighty-four men. This, with a ledge from twelve to twenty-four inches is, you will allow, good work. The new mill will consume one and a half cords wood less per day, and require two men less, so our old cost of reduction ($2) will be materially reduced. For the month of August it cost $12 25 to mine and reduce the rock. As Mr. NESMITT'S safe proved to be a broken reed, and destroyed all books and papers, he will have a clean start."

Washington Territory.

A special correspondent of the San Francisco *Bulletin* thus writes of Seattle and its coal-mines: "This city has not less than 200 buildings, 500 yards of wharf, and at any time probably during the last three years from three to five barks from San Francisco; three to six Sound steamers, besides sundry sloops and barges might be seen there. One writer says he counted fifteen steamboats at once. The citizens of Seattle are a progressive and independent people. For instance, they say: 'We do not know whether the great railroad terminus will be placed here or not. We have a good harbor, a good country to back us, good coal mines, and centrally located; we have all the resources, when developed, to make a large town. If the railroad company chose to add the terminus to our already ample endowments, we accept it in a business way.' As the coal-mines near here have been noted in a previous number, I merely add the analysis of the coal: 100 parts taken—carbon, 47.63; bitumen, 50.22; ash, 2.15. So (?) the seam being from five to nine feet in thickness promises a favorable working basis.

"BELLINGHAM BAY

is a fine body of water, about seven miles long by six wide, oval in shape, with from five to ten fathoms, and good holding-ground for anchorage; it is landlocked, and supports a mild and agreeable climate. The main improvements on the bay are the Bellingham Bay Company's mine and works and appurtenances thereto attached. The mine is of unexplored extent, and about sixteen feet in thickness, which is divided by two clay seams, six inches in thickness, into three parts, rendering it much easier to mine. This is also a San Francisco company, and they employ two engines of San Francisco, made to do the hoisting and pumping. They have facilities for hoisting from fifty to 200 tons per day. By the courtesy of the energetic Superintendent we gleaned many more interesting items concerning this place and its surroundings than we have space to note. This enterprising company have expended liberally and overcome huge difficulties to bring the mine and the works to the present state of completeness and success. During the past year they have erected a new wharf and coal-chutes at an expense of $35,000, which is one of the most substantial and convenient improvements to be found. The coal is now being used by coal-dealers in Victoria for supplying steamers, as the quality seems to be improving as they work lower down upon the lower vein. The mine is now down perpendicularly 500 feet from the surface, while the tramway is 900 feet in length. They are looking for the terminus here, too, and as it is only twenty miles from our international boundary-line on the north, there is no show for it to go beyond. Citizens here are also encouraged in this belief by an unofficial article which is going the rounds of the press, of which the following is an extract: 'From the North of Salmon river, I. T., it (the R. R. line) reaches the Columbia at Wallula, and following that river west to Vancouver and then north to Monticello, W. T., and there leaves it (the Columbia) and continues north along Puget Sound and the adjacent waters to the international boundary in W. T.' The road has been recognized by the department to Seattle, on Puget Sound, W. T. Whatcom, at the head of the bay, is the county seat of Whatcom county, and contains a court-house and a jail of brick, but no prisoners. Though the population of the county seat is but small now, yet during the Fraser river gold excitement it had a population of 5,000. The soil in the vicinity is fertile, where under cultivation, the greater part of it being still shaded by its primitive forests, with occasionally a small clearing made by a hardy pioneer, but enough to show the quality of the soil.

The Vienna Coal and Iron Company has been organized at Vienna, Trumbull county, for the purpose of mining stone coal and manufacturing pig and other iron, and disposing of the same. The capital stock is $300,000, divided into shares of $100 each.

MARKET REVIEW.

The Coal Trade.

NEW YORK, Oct. 21, 1870.

WHOLESALE.—Trade has not recovered from the dullness that prevailed last week. The announcement of the usual Scranton sale (which is to take place on Wednesday next,) of 90,000 tons of coal, is not calculated to give any better shape to matters and things. In fact, the recent earthquake seems to have entirely knocked the bottom out of the coal trade, and left us literally nothing, even in the shape of prices. The immense production of coal this year over last—some 2,620,900 tons—is the sole cause of this. Where we would have been, had not Schuylkill county been on a strike all spring, (thus greatly lessening the production,) it would be hard to tell.

Everybody that we have come in contact with during the past six months, has been under the impression that the accumulating increase, weekly shown in our table of shipments, was not an actual fact; in other words, they were under the impression that, in consequence of the long strike of last year, the increased production this year would only make a fair average production for the two years. This, however, does not seem to be the case, even with the long strike of last year, we evidently produced all the country required for the year, and this year entirely too much.

The Pennsylvania Coal Company have issued a circular this day, with the following quotations from November, namely: Lump, $4 30; Steamer, $4 30; Grate, $4 50; Egg, $4 60; Stove, $4 90; Chestnut, $4 20; deliverable at Newburgh. We have also a notification from the Wilkesbarre Coal and Iron Company, that their superior prepared coals will be offered next month at reduced prices. These low figures will, of course, bear upon the Scranton sale, and the 90,000 tons offered next Wednesday will be sold at a heavy decline. There has evidently been declared a *war upon prices*, and we fold our hands resignedly, feeling satisfied that it is best to have it come now—come all at once, and give us clear sailing through the balance of the season. We have not been misled, with many others, in supposing that the most of the increase shown in our table had been consumed; hence our advice urging dealers to buy; and this same advice even holds good now. We do not know what unforeseen accident may immediately happen, and thus force up prices. This sudden lack of confidence by the leading companies may be only a forerunner of the fact. Prices have now receded to so low an ebb as to *positively* leave no profit to the producer. That a change, a revolution, a strike, must take place, in order to regulate and place the coal trade on a healthy business basis, ought to be patent to everybody—and it will certainly transpire.

Anthracite Coal Trade for 1869 and 1870.

The following table exhibits the quantity of Anthracite Coal passing over the following routes of transportation for the week ending October 8, 1870, compared with week ending October 9, 1869.

COMPANIES.	1869. WEEK.	1869. TOTAL.	1870. WEEK.	1870. TOTAL.
*Phila. & Reading R. R	64,214	2,699,128	95,962	2,371,552
Schuylkill Canal	5,546	51,532	26,621	327,926
Lehigh Valley R. R.	36,512	1,703,032	54,834	2,417,361
Lehigh & Sus. R. R.	3,165	613,188	24,571	813,215
Lehigh Canal		583,284	27,764	592,317
Scranton North	17,639	312,183	10,751	592,667
" South	25,820	773,268	41,694	1,310,770
Penn. Coal Co., rail	14,749	773,787	24,697	914,020
" " " canal	238	14,846	118	14,469
Del. & Hud. Canal Co.	4,846	869,129	10,993	1,125,291
" " R. R.	3,659	111,943	15,762	382,923
" " south	6,691	81,251	8,222	357,769
Shamokin	13,024	342,522	11,078	379,741
Trevorton	2,515	84,816		67,371
Lykens Valley Coal Co.	1,461	57,857	5,420	118,295
Wyoming South	16,199	2,717,161		2,258,914
Wyoming North	6,031	53,727		
P. N. Y. C. & R. R. Co.			4,472	241,594
Williamstown, Col'y	9	151,189	6,983	237,052
Short Mountain	1,197	54,343		
Big Lick Colliery				
Total	278,663	10,03,494	368,547	14,624,389
1869			278,663	10,003,494
Increase week and year			89,884	2,620,905

* Less coal transported for Company's use and Bituminous coal.

Bituminous Coal Trade, 1869 and 1870.

The following table exhibits the quantity of Bituminous Coal passing over the following routes of Transportation for the week ending Oct. 15, 1870, compared with week ending October 16, 1869.

COMPANIES.	1869. Week.	1869. Year.	1870. Week.	1870. Year.
B. & O. R. R.	21 000	786,000	26,399	786,349
C. & O. Canal	16 000	459 000	5,963	482,746
H. & B. T. R. R.	7 058	282,009	....	568,145
Harrisburg & D.	10 150	....	14,921	614,755
L. V. R. R.	....	552		19,944
P. & N. Y. C. & R. Co.	....	....	6,631	205,019
	54,208	1,557,5 1	53,914	2,676,957

Philadelphia and Reading R. R.

Amount of coal transported on the Philadelphia and Reading Railroad for the week ending Thursday, Oct. 13, 1870:

From St. Clair	40,774 06
" Port Carbon	6,370 00
" Pottsville	3,957 01
" Schuylkill Haven	24,665 16
" Auburn	5,386 08
" Port Clinton	14,541 09
" Allentown and Alburtis	509 09
" Harrisburgh and Dauphin	14,921 03
Total paying freight	110,783 12
Coal for Company's use	4,334 19
Total for week	115,118 11
Previously this year	2,915,504 00
Total	3,0 0,622 11
To same time last year	3,378,207 06

Schuylkill Canal.

Report of coal transported over the Schuylkill Canal for the week ending Thursday, October 13, 1870.

	Tons. Cwt.
From Port Carbon	— —
" Pottsville	— —
" Schuylkill Haven	25,774 00
" Port Clinton	847 00
Total for week	26,621 00
Previously this year	301,325 10
Total	327,946 10
To same time last year	319,522 16

Summit Branch Railroad Company.

The following is the quantity of Coal shipped from Williamstown Colliery, for week ending Saturday, October 15, 1870 ..... 6,983 18
Same time last year 9 18

Increase, Tons 6,974 00
Total amount shipped to date 237,052 16
Same time last year 151,189 07

Increase, Tons 85 863 09

Report of Coal Transported by the Lehigh Coal and Nav. Co.'s Railroads and Canals,

Week ending October 15, 1870—Compared with same time last year.

WHERE SHIPPED FROM	WEEK, 1870. tons ct	WEEK, 1869. tons ct	YEAR 1870. tons cwt.	YEAR, 1869. tons cwt.
Wyoming Region	26542 08	21827 16	960745 12	625144 01
Upper Lehigh Region	3428 06		119339 03	77288 03
Mahanoy Region	97 08		1740 06	2531 01
Hazleton Region	8752 00	202 04	251646 07	121250 05
Beaver Meadow Region	3479 06		119070 19	93849 11
Mauch Chunk Region	13691 18	9205 00	143975 11	324933 08
Totals	56291 07	31235 00	1596516 18	1244786 09
Increase	25056 07		351730 09	
Decrease				
DISTRIBUTION.				
Forwarded East of Mch Chunk by Rail	24371 12	30165 15	813215 12	613088 16
Forwarded East of Mch Chunk by Canal	27764 12		592367 15	583284 04
Delivered at and above Mauch Chunk	1198 17	702 15	34571 10	27009 17
Delivered to L. & B. R. R. at Plymouth Bridge	2956 06	66 10	156362 01	16252 09
L. V. R. R. at Sugar N.				5151 03
Totals	56291 07	31235 00	1596518 18	1244786 09
Of the above there was transported on acc'nt of L. C. & N. Co.	16843 08	11202 01	175332 02	348838 08
W.-B. C. & I. Co.	11524 10	8898 12	46276 15	314947 08
Totals	1367 18	4110 13	641308 17	66785 16
Increase	10.67 0.			
Decrease			22476 19	

Report of Coal Transported over Lehigh Valley Railroad

For the week ending October 15, 1870, and previously this season, compared with same time last year:

WHERE SHIPPED FROM.	WEEK. Tons. Cwt.	PREV'LY. Tons. Cwt	TOTAL. Tons. Cwt.
Total Wyoming	10,4 7 17	501,1 5 02	511 622 19
" Hazleton	40,95 15	1,7 7,1 3	1,748 1 16
" Upper Lehigh	34 0	11,353 04	11 387 06
" Beaver Meadow	12,865 17	607,0 9 04	619,905 01
" Mahanoy	9,666 07	245,4 6 15	235,103 02
" Mauch Chunk	112 19	943 12	1,056 11
Total Anthracite	74,092 17	3,053,178 18	3,127,271 15
Bituminous Coal recv'd from Cats. R. R.			
N. C. R. R.			
E. P. R. R.		10,943 00	10,943 00
P. & N. Y. C. & R. R. Co			
Fall Creek			
Schroeder			
Towanda			
Total by rail and canal	74,0 2 17	3,064,121 18	3,138,214 15
Same time last year	31,271 02	1,944 8 3 02	1,976 124 04
Increase	42,821 15	1,119,288 16	1,162,090 11
Decrease			
Forwarded East from M'h Chunk by rail	54,833 13	2,402,427 11	2,457,261 04
Same time last year	30,812 04	1 672,219 17	1,703,032 01
Increase	24,021 09	73,207 14	754,229 03
Decrease			

RECAPITULATION.

Forwarded East from M'h Chunk by rail	54,833 13	2,402,427 11	2,457,261 04
To N. C. R. R., at Mount Carmel	....	3,266 19	3,266 19
Forwarded North from L. & B. Junction	4,397 14	236,988 01	241,385 15
To L. & S. R. R. at Packerton for rail	273 03	6,783 14	7,056 17
Delivered at M'h Chunk	85 16	975 06	1,061 02
Delivered on line of road above Mauch Chunk	352 08	8,539 11	8,891 19
Delivered above M. Chunk for use of L. V. R. R.	1,406 14	43,882 07	45,289 01
To L. & S. R. R., at P'n Hav., for railroad	8 866 15	234,671 10	243,538 05
Do for canal	3,876 14	115,643 19	119,520 13
At M. Chunk for canal			
Total Anthracite	74,092 17	3,053,178 18	3, 27,271 15
Bituminous Coal		10,943 00	10,943 00
Total all kinds	74,092 17	3,064,121 18	3,138,214 15

Delaware, Lackawanna, and Western Railroad.

COAL Transported for the week ending Saturday, October 15, 1870.

	WEEK. tons. cwt.	YEAR. tons. cwt.
Shipped North	10,751 16	592,677 01
Shipped South	40,694 16	1,30,770 06
Total	51,446 02	1,923,447 07
For the corresponding time last year,		
Shipped North	17 639 06	302,673 02
Shipped South	25,8.0 07	775,266 02
Total	43,459 13	1,075,949 04
Increase	7,986 09	907,486 03
Decrease		

Penn. and N. Y. Canal and Railroad Co.

REPORT of Coal Transported via the Pennsylvania and New York Canal and Railroad Company, for week ending Oct. 15, 1870:

	WEEK.	PREVIOUSLY.	TOTAL.
Anthracite	4,402 14	237,492 06	241,894 01
Bituminous	6,631 00	198,387 00	205,019 00
Total, Ant. and Bit.	11,0 3 14	435,879 06	446,913 01

Delaware and Hudson Canal Company.

Coal mined and forwarded by the Delaware and Hudson Canal Company, for week ending Saturday, October 15, 1870.

	WEEK.	SEASON.
North	20,511 09	1,689,470 08
South	8,292 15	357,769 04
Total	28,804 04	2,047,1 9 12
CORRESPONDING TIME IN 1869:		
North	45,743 19	971,238 05
South	6,699 02	19,534 18
Total	51,943 01	1,050 7:3 03
Decrease North	24,732 10	Inc. 718,182 03
Increase South	1,591 13	Inc. 278,234 06
Total Decrease	23,1:8 17	Inc. 996,416 09

The following is a statement of coal transported by the Delaware and Hudson Canal Company, for the week ending October 15, 1870.

	WEEK.	SEASON.
By Del. and Hud. Canal	10,993 00	1,125 291 00
By Railroad	15,762 00	382,923 00
South	8,292 00	357,769 00
Total	35,047 00	1,865,983 00
Corresponding time in 1869.		
By Del and Hud. Canal	4,846 00	869,279 00
By Railroad	3 659 00	111,943 00
South	6,699 00	81 251 00
Total	15,204 00	1,062,413 00
Increase	804,570 00	

Pennsylvania Coal Company,

Shipments of Pittston Coal for the week ending Oct. 15, 1870.

	1870. WEEK.	1870. YEAR.	1869. WEEK.	1869. YEAR.
By Railway	24,603 00	914,299 15	15,709 00	770,787 18
" Canal	1 8 07	14,469 16	238 00	14,8:6 01
Total	24,721 07	928,679 11	18,947 00	785,683 19
Increase, 1870, 142,995 12 tons.				

Harrisburgh and Dauphin Coal Trade.

The following is the amount of Bituminous Coal transported via the P. and R. R. for the week ending Oct. 13, 1870:

	Tons.
For week	14,921 03
Previously this year	599,834 06
Total,	614,755 09
Same week last year	10,150 14

Shipments of Cumberland Coal

for the week ending Saturday, October 15, and for the year 1870:

SHIPPED BY	B. & O. R. R.	C. & O. CANAL.	TOTAL.
Cooke M.	.....	.....	.....
Borden	1 757 05	455 08	2,212 13
Consolidation	4,019 17	2,732 10	6,752 07
Spruce Hill	612 15	.....	612 15
Midiot tan	117 13	.....	117 13
H. and Baltimore	69 18	1,494 10	1,564 08
do Va M	1,399 16	.....	1,399 16
V C & I Co	528 19	.....	528 19
G. C. C. and I.	1,038 02	.....	1,038 02
Big Vein	2,177 10	.....	2,177 10
Maryland	3,822 03	221 09	3,822 03
American	1 735 04	1,032 08	2,767 12
Atlantic	1,341 07	.....	1,341 07
Piedmont	1,913 00	.....	1,913 00
Swanton	1,259 13	.....	1,259 13
Barton	962 00	.....	962 00
Potomac	1,502 15	.....	1,502 15
Franklin	1,641 19	.....	1,641 19
George's Creek M. C.	721 11	.....	721 11
Total week	24,399 18	5,936 05	32,336 03
Previous	759 949 16	476 810 00	1,236,756 16
Total year	786,349 14	482,746 05	1,260,095 19

Prices of Coal by the Cargo.

[CORRECTED WEEKLY.]

SCHUYLKILL.	AT NEW YORK, October 21. R. A.	W. A.	AT PHILADELPHIA, October 21. R. A.	W. A.
Lump	$— —	$5 00	4 75	4 50
Steamer	— —	5 00	— —	4 50
Broken	— —	5 50	— —	4 50 to 4 75
Egg	5 75 to 6 50	5 50 to 5 75	— —	4 50 to 4 75
Stove	5 75 to 6 50	5 75 6 25	— —	4 50 to 4 75
Chestnut	4 50 to 5 75	7 25 4 50	— —	4 25 to — —
Pea	— —	— —	— —	— —
LEHIGH.				
Lump, (along side)	5 85	— —	— —	— —
Broken	5 75	— —	— —	— —
Egg	5 85	— —	— —	— —
Stove	6 10	— —	— —	— —
Chestnut	5 10	— —	— —	— —
Pea	— —	— —	— —	— —
SPECIAL COALS.*				
Diamond Vein	R. A.	6 50	— —	— —
New England	"	— —	— —	— —
Locust Dale	W. A.	6 25	— —	— —
Honey Brook, Le'h	W. A.	4 75 to 5 75	— —	— —
Spring Mountain	" "	4 75 to 5 75	— —	— —
Sugar Creek	" "	4 75 to 5 75	— —	— —
Sugar Loaf	" "	4 50 to 5 75	— —	— —
Old Comp'y's	" "	4 75 to 5 75	— —	— —
Cross Creek	" "	4 75 to 5 75	— —	— —
Enterprise	" "	— —	— —	— —
Girardville	" "	— —	— —	4 75
McMichael	" "	— —	— —	4 75
Shamokin	" "	5 50	5 25	— —
Lykens Valley	" "	— —	5 75	— —
Broad Top	" "	5 50	— —	— —
Hill & Harris	" "	— —	4 75	— —
Henry Clay	" "	— —	5 00	— —
Powelton	" "	5 50	— —	4 75

[*Dealers in these coals may be found in our advertising columns.]

Prices for Coal at Mauch Chunk.

	F. L.	Bro.	Gra.	Eg.	Sto.	Cst.
Lehigh	$3 00	$3 75	$3 75	$3 75	$4 00	$3 00
Wilkesbarre	3 00	3 75	3 75	4 75	4 00	3 00

For freight to Elizabethport and to New York see "Freights."

BITUMINOUS COALS.

Kittaning Coal Co.'s Phœnix Vein...f.o.b. at Phila.	$5 00
Lemon " " "	4 75
Cumberland Vein Coal	4 75
Cumberland C. & I. Co.'s on board N. Y.	7 00
Maryland Coal Co. "	7 00
Consolidated Coal Co.'s "	7 00

Company Coals.

	L.	Str.	Gra.	Eg.	Sto.	Ches.
Scranton at E. Port	4 25	4 50	5 25	5 00	5 50	4 50
Pittston at Newburgh	4 30	4 30	4 50	4 60	4 90	4 20
Lackawana at Rondout	4 50	4 60	4 60	5 00	5 50	4 50
Wilk'b're at Hoboken	4 50	4 50	5 25	5 25	5 75	4 50
Old Co. Lehigh at Pt. Johnston	5 50	5 40	5 40	5 50	5 75	4 75
Lehigh at E. Port	5 25	— —	5 25	5 50	5 75	4 50

For freights to different points, see "Freights."

Prices at Baltimore—October, 1870.

Wholesale Prices to Trade.

Wilkesbarre, by cargo or car load	$4 80@— —
Pittston and Plymouth, do	5 69@5 75
Shamokin Red or White Ash, do	— —@6 00
Lykens Valley Red Ash, do	6 25@— —
Zerba Valley	5 25@— —
Treverton	6 00@— —
By retail, all kinds per ton of 2240 lbs	7 25@8 25
Georges Creek & Cumberland f. o. b. at Locust Point for cargoes	4 60@4 75
Fairmont and Clarksburg gas, f. o. b. at L. Point	6 00@6 50

Prices at Georget'n, D.C., & Alexandria, Va.

October, 1870.

George's Creek and Cumberland f. o. b. for shipping ..$4 55

Prices at Havre de Grace, Md.

Wilkesbarre and other White Ash for cargoes	$— —@5 50
Lykens Valley	— —@6 25
Shamokin Red or White Ash	— —@5 75
Trevorton and Zerba Valley	— —@6 00

Prices of Gas Coals.

October, 1870.
PROVINCIAL.

Corrected weekly by Louis J. Belloni, Jr. 41-43 Pine st., N.Y.

	Duty, $1 25, gold. Coarse.	Slack.
Block House	$1 75	@— 75
Gowrie	1 75	@— 75

Corrected by Bird, Perkins & Job, 86 South street.

	Coarse.	Culm of Coal.
Pictou	$2 25	@1 25
Sydney	2 25	@— 80
Lingan	1 75	@— 80
Little Glace Bay	1 75	@1 00
Caladonia	1 60	@— 80

A discount from the prices of the coarse Coal on purchase of 5000 tons and upwards. Duty $1 25 per ton, gold, on the coarse coal. 25 per cent. ad valorem on the Culm of Coal.

AMERICAN.

	Coarse.	Slack Currency.
Fairmount Gas Coal Co. of N. Y.	7 50	@— —
Despard Coal Co	$7 50	@— —
Penn	— —	@— —
Newburg Orrel Gas	— —	@— —
West Fairmount Gas Coal	8 00	@— —

AT PHILADELPHIA.

Powelton	$7 80

Prices of Foreign Coals.

October, 1870.
Duty $1 25 per ton.

Corrected weekly by PARMELE BROS., No 32 Pine street, New York.

Liverpool Gas Caking	$ 9 00@— —
" " Cannel	11 50@12 50
" House	15 00@16 00
" " Orrel	12 00@14 00

Per ton 2,240 lbs., ex-ship.

PRICES FROM YARD.

Liverpool House Orrel, screened	$16 00@17 50
" " Cannel	18 00@20 00

Per ton 2,000 lbs. delivered

Rates of Transportation to Tide Water.

BY RAILROAD.

TO PORT RICHMOND, PHILADELPHIA.

Philadelphia and Reading Railroad, from Port Carbon	$2 00
Less drawback of 80 cents on all Coal shipped east of New Brunswick and south of Cape Henry,	

MAUCH CHUNK TO ELIZABETHPORT.

L. V. Railroad from Mauch Chunk to Easton	$ 81
C. R. R., N. J., Easton to Elizabethport	1 15
Shipping expenses at Elizabethport	25
Warfage	10
Total	$2 31

MAUCH CHUNK TO PORT JOHNSON.

L. V. R. R., or L. & S. R. R. from M. C. to Easton	$ 81
C. R. R., of N. J., Easton to Pt. Johnson	1 19
Shipping expenses	25
Warfage	10
Total	$2 35

TO HOBOKEN.

L. V. R. R., Mauch Chunk to Easton	$ 81
Morris & Essex R. R. Easton to Hoboken	1 19
Shipping expenses	25
Warfage	10
Total	$2 35

TO SOUTH AMBOY.

L. V. R. R.	81
B. & D. R. R. } Cam. & Am. R. R. }	1 09
Shipping Expenses	25
Total	$2 15

PENN HAVEN TO ELIZABETHPORT.

L. V. RR. Penn Haven to Easton	95
C. RR. of N. J. Easton to Elizabethport	1 15
Shipping expenses	25
Wharfage	10
Total	$2 45

BY CANAL.

Via Schuylkill Canal.

TO PHILADELPHIA.

From Schuylkill Haven	$1 07
" Port Carbon	1 10
" Port Clinton	1 00

TO NEW YORK.

From Schuylkill Haven	$1 70

Via Lehigh Canal.

TO PHILADELPHIA.

Lehigh Canal	$0 70
Freight and towage	1 07
Total	$1 77

TO NEW YORK.

Lehigh Canal	$ 40
Morris " } Freight, Towing }	2 10
Total	$ 2,50

TO JERSEY CITY.

Lehigh Canal	$ 40
Morris " } Freight }	2 05
	2 45
For re-shipment	2 19

Via Delaware and Raritan Canal.

TO NEW YORK.

Lehigh Canal	$ 40
Delaware Division Canal	30
Delaware and Raritan Canal	35
Freight	1,25
Towage	20

TO NEW BRUNSWICK.

Lehigh Canal	$ 40
Delaware Division Canal	30
Delaware and Raritan Canal	1 35
Freight	1 05
Total	$ 2,10

For Re-shipment—30 extra for shipping, less 10 cents. drawback.

Towing Rates.

TO EASTERN PORTS.

	Per Ton.
To New Haven	$ 40
Bridgeport	40
Southport	40
Westport	40
Norwalk	40
Stamford	40
	Per Boat.
Greenwich	$70 00
Port Chester	60 00
Mamaroneck	70 00
Glen Cove	60 00
New Rochelle	55 00
East Chester	60 00
West Chester	50 00
White Stone	30 00
College Point	25 00
Flushing	30 00
Harlem and Mott Haven	20 00
Fort Morris	20 00
Ninety-first street and Astoria	16 00

Boats beyond Port Chester, with less than 200 tons, $80 per Boat.

TO RIVER PORTS

Boats of 150—250 Tons.

	Per Ton.
To Manhattanville	8 cents
Spuyten Duyvil	8 "
Yonkers	9 "
Hastings	10 "
Piermont	12 "
Dobbs' Ferry	12 "
Nyack	14 "
Tarrytown	15 "
Sing Sing	16 "
Croton Landing	17 "
Haverstraw	17 "
Verplanck's	17 "
Peekskill	18 "
West Point	20 "
Cold Spring	20 "
Newburgh	18 "
Poughkeepsie	22 "
Rondout	22 "
Boats of 100 Tons.	Per Boat
To Manhattanville, and Return	$11 00
Spuyten Duvvil, "	13 00
Yonkers, "	15 00
Sing Sing, "	20 00
Peekskill, "	25 00

Freights.—OCTOBER, 1870

TO EASTERN PORTS.	From Philada.	From E. Port and Port Johnson.	From Newburg	From Rondout
Amesbury	$2 50	$2 00	$	$
Bangor	2 25	1 60	1 60	
Bath	2 25	1 75		
Boston	2 35	1 65	2 25	1 90
Bridgeport	1 75	1 00	1 10	1 20
Bristol	2 00	1 40	1 40	
Cambridgeport	2 35	2 00		
Derby	2 00	1 20		
Dighton	2 30	— —	1 45	
East Cambridge	2 35	2 00		
Fall River	2 00	1 40	1 40	
Hackensack	1 75	1 00		
Hartford	2 50	1 50		
Jersey City	1 35	60		
Middletown	2 25	1 25		
Mystic	— —	1 25	1 30	
New Bedford	2 00	1 40		
Newburyport	2 50	1,75		
New Haven	1 90	1 00	1 10	1 20
New London	2 00	1 20	1 25	1 30
Newport	2 00	1 40	1 40	
New York	1 35	60	70	
Norwalk	1 80	1 00	1 05	
Norwich	2 00	1 30	1 35	1 40
Pawtucket	2 25	1 50	1 60	
Portland	2 25	1 75		
Portsmouth, N. H.	2 25	1 85		1 85
Providence	2 00	1 40	1 45	1 45
Rockport	2 10	1 65		
Saco	2 25	1 75		
Sag Harbor	1 70	1 20	1 30	
Salem	2 25	1 65	2 25	2 35
Stamford	2 00	1 00	1 00	
Stonington	2 00	1 30	1 25	
Taunton	2 30	2 00		
Warren	— —	1 40	1 45	
Washington	1 25			
TO RIVER PORTS.				
Albany		90	— 60	
Catskill		— —	— 50	
Cockaackie		— —	— 60	
Coeyman's		— —	— 75	
Cold Spring		— —	— 35	
Fishkill		— —	— 30	
Haverstraw		50	— 60	
Hudson		— —	— 50	
New York		— —	— 70	
Nyack		60	— 60	
Poughkeepsie		— —	— 35	
Rhinebeck		— —	— 30	
Rondout		— —	— 40	
Saugerties		— —	— 40	
Sing Sing		— —	— 75	
Stuyvesant		— —	— 55	
Tarrytown		80	— 75	
Troy		90	— 75	
West Point		— —	— 35	
Yonkers		40	— 60	

Foreign and Provincial Freights.

October, 1870.

Foreign.	
Newcastle and Ports on Tyne, per keel of 21 1-5 tons	£14 00@£16 00
Liverpool, 5 per cent primage	13s. @16. ton
TO NEW YORK.	
Provincial	
Sidney	$—
Lingan	—

Cow Bay	—
Port Caledonia	—
Little Glace Bay	—

TO BOSTON.

Sydney	$—
Lingan	—
Cow Bay	—
Port Caledonia	—
Little Glace Bay	—

METALS.

NEW YORK, October 22, 1870.

IRON.—Duty: Bars, 1 to 1¼ cents ₱ lb; Railroad, 70 cents ₱ 100 lbs.: Boiler and Plate, 1¼ cents ₱ lb; Sheet, Band, Hoop, and Scroll, 1¼ to 1¾ cents ₱ lb; Pig, 9 ₱ ton; Polished Sheet, 3 cents ₱ lb.

	Store Prices.
Pig, Scotch No. 1, ₱ ton	32 50@36 00
Pig, American, No. 1	33 00@— —
Pig, American, No. 2	31 00@32 00
Pig, American, Forge	27 00@29 00
Bar, Refined, English and American	— —@75 00
Bar, Swedes, assorted sizes (gold)	85 00@160 00
	Store Prices, Cash
Bar, Swedes, ord'y sizes, less 5 ₱ ct.	— —@110 00
Bar, Refined " "	80 —@ 85 00
Bar, Common " "	75 00@ 80 00
Scroll " "	97 50@130 —
Ovals and half-round " "	100 —@125 —
Band " "	95 —@ — —
Horse Shoe " "	95 —@ — —
Rods, ⅜ to 3-16 inch " "	85 —@120 —
Hoop " "	105 —@150 —
Nail rod, less 5 ₱ ct.	— 7@— 7½
Sheet, Russia, as to Nos. (gold)	11 @—11¾
Sheet, Single, D, and T. Common	—4¾@— 6
Sheet, Galv'd, Nos. 14 to 26 10 and 12c. Nos. 27, 28, and 29, 13@14	
Rails, English (gold), ₱ ton	57 00 @59 00
Rails, American, at Works in Pa	70 00 @71 00

STEEL.—Duty: Bars and ingots, valued at 7 cents ₱ ₱ or under, 2½ cents; over 7 cents and not above 11, 3 centsore ₱ ; over 11 cents, 2½ cents ₱ lb, and 10 ₱ cent ad val. (St prices.)

English Cast (2d and 1st quality) ₱ lb	— 15	@— 18
English Spring (2d and 1st quality)	— 7	@— 10
English Blister (2d and 1st quality)	— 10	@— 17
English Machinery	— 11½	@— 14
English German (2d and 1st quality)	— 13	@— 15
American Blister "Black Diamond"	— —	@— 12
American, Cast, Tool do.	— —	@— 12
American, Spring, do.	— 9	@— 11
American Machinery, do.	— —	@— 12
American German, do.	— 9	@— 12

COPPER.—Duty: Pig, Bar, and Ingot, 5; old Copper 20cents ₱ lb; Manufactured, 45 per cent. ad val.

	All Cash.
Copper, New Sheathing, ₱ lb	— @— 30
Copper Bolts	— @— 32
Copper Braziers, 16oz. and over	— @— 32
Copper Nails	35 @— 37
Copper, Old Sheathing, &c., clean	— @— 19
Copper, Chili Pig	— @— —
Copper, American Ingot	— @— 21¾
Yellow Metal, New Sheating	— @— 22
Yellow Metal Bolts	24 @— —
Yellow Metal Nails	— @— 22

LEAD.—Duty: Pig, $2 ₱ 100 lbs.; old Lead, 1½ cents ₱ lb; Pipe and Sheet, 2½ cents ₱ lb.

Galena, ₱ 100 lbs	$— @— —
Spanish (gold)	6 30 @6 35
German, do.	6 30 @6 35
English, do.	6 30 @6 62½
Bar (net)	7 50 @— —
Pipe (net)	7 50 @— —
Sheet	8 00 @— —

TIN.—Duty: Pig, Bars, and Blocks, 15 ₱ cent. ad val.; Plate and Sheets and Terne Plates, 25 ₱ cent. ad val.

	Gold ₱ lb.
Banca	36¼@36½
Straits	—¾@33
English	— @32

PLATES.

Fair to Good Brands.	Gold.	Currency.
I. C. Charcoal, ₱ box	$8 25 @8 87½	$9 75 @10 25
I. C. Coke	7 25 @8 —	8 50 @ 9 50
Coke Terne	5 65 @6 75	6 75 @ 7 75
Charcoal Terne	7 50 @8 —	9 00 @ 9 50

SPELTER.—Duty: In Pigs, Bars, and Plates, $1 50 ₱ 100 lb

	Gold.
Plates, Foreign ₱ 100 lbs.	$— — @ 6 12½
Plates, Domestic ₱ lb.	7 1-16@— 11½

REMARKS.

IRON.—The supply of Scotch Pig is still light, and as the demand continues active, prices are inclined to favor sellers; sales 100 tons Gartsherrie at $35 50 from store; 50 do. Glengarnock, in two lots, $34 50; and 200 do. same on private terms. There has been no improvement in the demand for American, and prices are irregular; we have only to notice a sale of 300 tons Lehigh Gray Forge at a private price. Wrought Scrap is in fair demand, and we note sales of 200 tons No. 1, and 100 do. old Car Wheels, on private terms. New Rails meet with very little inquiry, but prices are unchanged; Old are in fair demand at steady rates; the sales are 75 tons old T at $39 25, gold; 200 do., to arrive, $44 currency; and 50 do. old Street, on terms not made public. Refined Bar from store continues steady in its inactivity, and nominally unchanged in price; we quote $80 per ton for ordinary sizes, to $85 for ½ inch, though we hear that one house is selling at $2 50 per ton less. The lowest mill price of Refined in Philadelphia is $80 for assorted sizes, and in Pittsburg 3¼ cents per lb., making the cost here $82 75 from the former, and $80 52 from the latter place. Sheet is very dull.

LEAD.—The inquiry for Pig is limited, but prices are without change; 25 tons Spanish sold at $6 35, gold; and 75 do. was taken at a private price. Bar 7½ cents, Pipe 7½, and Sheet 8, net cash.

TIN.—Pig has become quite dull and stocks are offered at rather easier prices. Straits may be quoted 33 cents, Banca 36¼ @ 36½, and English 32, all gold; five tons of the latter sold at 32 cents, 60 days. Plates have moved more freely and prices are steady; sales have been made of 500 bxs. ¼d X at $8 25 for I. C.; 200 do. Coke Terne, $5 65, gold; 1,000 do. Charcoal Terne, 500 do. I. C. Coke Tin, 14 by 20, and 700 do., 10 by 14, on private terms.

COPPER.—The manufactures of Copper are without further change, and prices are steady at the revised rates noted in our last. Ingot is very quiet again, and the business has been light at the prices previously current; the sales embrace 100,000 lb. Lake at 21¼ @ 21¾ cents; and 50,000 lb. Baltimore, 21¼, cash.

SPELTER.—Foreign continues to be neglected, and in the absence of business, prices are wholly nominal at 6 @ 6¼ cents, gold, for lots on the spot.

STEEL.—There is no change to notice in quotations; business moderate.

ZINC.—Dry American, 6½ @ 7c.; French do., 10½ @ 11.c; Metallic do., 9¾ @ 10c.

MANGANESE—4½ @ 5c. per lb.

Mining Stocks.

NEW YORK, Oct. 21, 1870.

We have not much change to note in gold mining stocks. A sale of 200 Grass Valley was made this A. M. at 23c., which was the only transaction of the Board. The following table exhibits the condition of the market.

	Bid.	Asked.
Benton Gold	—	7
Black Hawk Gold	—	40
Central Gold	16	17
Consolidated Gregory	—	75
Grass Valley	25	—
La Crosse Gold	8	12
N. Y. & Eldora	20	50
Quartz Hill	19	21
Smith & Parmelee Gold	68	—

PETROLEUM.—The most noticeable feature of today's operations in Petroleum Stocks are sales of 1,000 shs. of U. Pet. Farms at 20c., and 500 shares of Central at 62c.: Walkill Assent. "Lead" is quoted at 4c. in miscellaneous. Stocks Bruns. C. Land is quoted at 5½c.; Rutland Marble, $25; Lehigh and Sus. $1. The annexed comparative table does not indicate any very material alteration between this week and the week previous. We may except "Home," which has declined 75c.

	Oct. 14. Bid.	Oct. 14. Asked.	Oct. 20. Bid.	Oct. 20. Asked.
Bennehoff	20	40	25	40
Bergen Coal and Oil	—	—	—	40
Blood Farm	—	—	—	—
Brevoort	—	50	50	—
Buchanan Farm	—	40	35	—
Central	58	65	63	—
Home Petroleum	1 70	2 50	1 75	—
N. Y. and Alleghany	—	—	1 75	—
National	—	1 50	10	—
Northern Light	—	—	—	75
Phillips' Pet	—	—	15	25
Pithole Creek	—	1 10	1 00	1 60
Rathbone	—	—	—	40
Rynd Farm	28	31	28	—
Second National	—	—	—	75
United Petroleum Farms	15	20	19	20
United States	—	75	60	75

San Francisco Stock Market.

Our reports from the San Francisco Stock Market have shown a steady advance on all the stocks on the list, it having declined to 25½c. Reference to the following table exhibits the condition of the market as compared with the week previous.

(By Telegraph.)

PER SHARE.	Oct. 11.	Oct. 18.
Savage	37	37½
Yellow Jacket	27½	29½
Kentuck	28	31½
Chollar Potosi	52¼	53⅛
Gould & Curry	83	101
Belcher	4¼	4⅞
Imperial	30	No sales
Amanor	250	242½
Crown Point	—	—
Ophir	—	—
Alpha	—	—
Hale & Norcross	—	—
Empire Mill	—	—

Prices of Slate in New York.

[Corrected weekly.]

(A "square" represents 100 superficial feet.)

PRICES OF ROOFING SLATE.

Vermont purple, 1st quality, per square	$6 50@	7 00
" green, 1st " "	6 50@	7 00
" red, 1st " "	15 00@	16 00
" variegated, "	5 75@	6 25
Pa. b'k and d'k blue, 1st qual., "	7 00@	8 00

VERMONT SLATE TRADE.

REPORT of Slate Shipped from Middle Granville, N.Y., via the R. & S. R. R., for the week ending October 15, and for the year 1870.

ROOFING SLATE.

NO. OF SQUARES.	Week.	Prev'ly.	Year.
Penrhyn Slate Co	500	4,765	5,265
New York Slate Co	....	2,950	2,950
Middle Granville Slate Co	6	506	512
*American Slate Co	....	....	....
Benj. Williams	....	1,128	1,128
Jones & Williams	....	70	70
Eagle Slate Co	....	153	153
H. W. Hughes	25	151	176
J. D. Jones	....	35	35
Total	531	9,758	10,289

* Penrhyn and American Co.'s shipments are consolidated for this season.

MANTELS, &C.

NO. OF CASES.	Week.	Prev'ly.	Total.
Eagle Slate Co	....	....	....
Penrhyn Slate Co	122	1,585	1,707

MILL STOCK.

NO. OF CASES SHIPPED BY	Week.	Prev'ly	Total.
Eagle Slate Co. cars	2	16	18
Penrhyn Slate Co "			

Hydeville, Vt.

REPORT OF SLATE SHIPPED FROM HYDEVILLE, VT., VIA R. & S. R R., FOR THE WEEK ENDING OCTOBER 15, AND FOR THE YEAR 1870.

ROOFING SLATE.

	WEEK.	PREVIOUSLY.	YEAR.
Eagle Slate Co. sqs.	300	305	605
Western Vermont Slate Co	6	20	26
Blue Slate Co	120	320	440
The Evergreen Slate Co	360	4040	4400
Forest Mining Slate Co	..	80	80
West Castleton Slate Co.	..	90	90
E. D. Billings	90	47	137
R. M. Copeland	47	80	127
W. E. Williams	..	80	80
Total	923	5062	5985

MILL STOCK.

Eagle Slate Co. bxs.	93 & 2 car loads	..	..

FINISHED MANTELS.

West Castleton Slate Co. box.	75	249	324
Forest Mining "	37	136	173
Total	....	....	497

BILLIARD BEDS AND BLACK BOARDS.

Eagle Slate Co. box.	30	42	72
West Castleton Slate Co.	330	149	479
Western Vermont	..	31	31
Total	360	222	582

TILE.

Eagle Slate Co. box.	70	1407	1577

PENNSYLVANIA SLATE TRADE.

SHIPMENTS OF SLATE OVER THE LEHIGH VALLEY, AND LEHIGH AND SUSQUEHANNA R. R., AND THE LEHIGH CANAL:

For the week ending October 15, 1870.

LEHIGH VALLEY R. R.

ROOFING SLATE.

Jones & Williams	105 squares.
Girard Slate Co	175 "
Lehigh Slate Co	105 "
Locke Slate Co	70 "
Kuntz & Woodring	35 "
J. Anthony	35 "
D. Thomas	35 "
Jones & Town	35 "
Total	595 "

SCHOOL SLATES.

D. Williams	38 cases.
Lehigh Slate Co	5 "
Total	43

MANTELS.

Lehigh Slate Co	5 cases.
Yerkes & Martin	52 "
Total	54 "

LEHIGH AND SUSQUEHANNA R. R.

ROOFING SLATE.

Eagle Slate Co	385 squares.
J. M. Coffin & Co	183 "
Twin City Slate Co	140 "
Continental Slate Co	42 "
Heimbach Slate Co	35 "
Thos. W. Parry	35 "
Thomas Kuntz	35 "
T. Beck & Co	3 "
Mauch Chunk Slate Co	1 "
Philadelphia Slate Co	35 "
National Slate Co	35 "
Total	929 "

SCHOOL SLATES.

A. W. Lerch	10 cases.

	Week.	Previously.	Total for Year.
L. and S. R. R.	929	7,520	8,449
L. V. R. R.	595	17,672	18,267
Lehigh Canal	—	3,362	3,362
Total	1,524	28,554	30,078

A Huge Petroleum Fraud.

Upon the records of the Court of Common Pleas in and for the City and County of New York, may be found by any one interested the complaint of JOSEPH T. SANGER against the United Petroleum Farms Association, GEORGE H. BISSELL, DAVID S. DUNCOMB, GEORGE W. ABBE, SAMUEL C. HARRIOTT, JAMES BISHOP, JEREMIAH MILLBANK, CAMILLE C. ROUMAGE, ERASTUS F. MEAD, DUNCAN F. CURRY, AUSTIN STEVENS, L. M. TENNEY, LUTHER WISE, W. L. CORTELLOU, GEORGE W. MEAD, FREDERIK PRENTICE, and SOUTHERLAND M. SEELEY.

The United Pretroleum Farms Association is a corporation existing in name, and was duly incorporated under the laws of the State in November, 1864, having for its capital stock, as appears by the certificate of incorporation filed in the office of the County Clerk,

TEN MILLIONS OF DOLLARS,

in a million shares at $10 each. The corporation was organized for the purpose of "raising, procuring, mining for, manufacturing, and selling pretroleum," and its concerns were to be managed by nine trustees for the first year. The trustees proceeded to complete the organization, and to issue the ten million dollars of capital stock.

A certificate, filed in the County Clerk's office in January, 1865, shows that the entire capital of *ten million dollars* had been paid in, and that the capital stock had been issued entirely in payment for certain lands purchased by the trustees, and necessary for the business of the corporation. But now comes an averment that at the time of such pretended purchase none of the trustees were stockholders; that no subscription for the stock was ever opened by, for, or in behalf of this corporation; that no stock was ever issued for such lands; that the value of any and all lands ever owned, possessed by, or transferred to said corporation, or purchased by the trustees, never was, at any time, then or thereafter, equal to one-tenth part of the capital of $10,000,000, as was well known to the trustees at the time of such

PRETENDED PURCHASE;

that the sum actually paid for the lands was far greater than their value at that time, and was obtained by sales of the capital stock at less than its par value, averaging about $1 50 per share, conducted by the trustees, one or more of whom held title to the lands, which are situated in the township of Cornplanter, Venango Co., Pa., and transferred them to the corporation, and actually took therefor the sums realized from sales of stock, and also the stock not so sold, excepting ninety thousand shares which were retained under the name of "reserved stock."

In June, '65, the stockholders met, and a reduction of their capital stock from $10,000,000 to $2,000,000, by reducing the par value of the shares to $2 each, was attempted, and a certificate declaring such change to have been effected was filed in the County Clerk's office.

A further charge against this immaculate corporation, or the "ring" which manipulated the funds, is, that it never engaged in raising, procuring, or mining for petroleum, nor in manufacturing or selling the same; but, on the contrary, leased the lands to other persons for a royalty, and sold portions for building and railroad purposes. Everything promised fair while dividends came along, and the stock was selling in the market for from 25 to 30 cents per share; but

A STORM AROSE

when the reserved stock was dipped into and sponged away in this wise:

At one meeting a committee was appointed to inquire into the price of the stock, and the expediency of selling it, as the Company needed money to carry out certain improvements. At a subsequent meeting the committee reported that the stock was worth only ten cents per share, and a resolution was passed to sell it at that price; and between the day of meeting, Feb. 15th, 1869, and the 28th of same month, the "reserved stock" was grabbed by D. S. DUNCOMB, E. F. MEAD, AUSTIN STEVENS, W. L. CORTELYON, GEO. W. ABBE, C. C. ROUMAGE, J. MILBANK, and L. M. TENNEY, who took ten thousand shares each, and LUTHER WISE and GEO. W. MEAD, five thousand each, making 90,000 shares in all. The allegation is that this purchase of stock for $9,000, when the same was well worth $22,500, was a conspiracy on the part of the trustees and secretary, who were wrongfully led thereto by the renewed activity in the production and price of petroleum, and by the fact that the corporation was negotiating the sale of lands or the right of way to the Oil Creek and Alleghany River Railroad Company, which sale was expected to realize about $40,000. This would have enabled the trustees to declare a good dividend on the stock and put up the market value thereof.

The actual value of the property held by the corporation is about $250,000, and it is alleged that under the present management the income derived therefrom is only about sufficient to pay the salaries of the officers of the company, with an occasional small dividend, when some large sale of land is effected, sufficient to keep the stock alive on the Stock Board.

Mr. SANGER, who has held five hundred shares of the capital stock since August, 1866, went into the concern in good faith, so he says, and not for stock-jobbing purposes; and his efforts are now directed towards having the property sold, the proceeds distributed among the various stockholders, and the bubble exploded. An injunction has been granted by Judge VAN BRUNT, but the conspirators have not yet put in an answer.

These petroleum speculators are rolling in wealth, and persistent in their efforts to get into fashionable society. In a cozy and retired office in the rear basement of No. 8 Pine street, may be found the officers of this corporation, which has been long well known to the stock brokers. A sign at the entrance is headed, "United Petroleum Farms Association;" then follows, "Home Petroleum Company, Hoffman Petroleum Company, and Blood Farm Petroleum Company," of which concern, judging from the sign, GEORGE W. ABBY and AUSTIN STEVENS are the master spirits, In the united concern are about 250 stockholders, and the corporation had originally about three hundred acres. The "ring" which was formed, it is said, bought up a lot of worthless and good property mixed, and organized several other companies; but whether they are the ones named on the sign, could not be ascertained.

A notable feature of the scheme, which appears to have been carried out, is the sale, from time to time, by the corporation, of portions of its real estate, which, in the first instance, was ostensibly bought by the issue of its entire capital stock, and the declaring of dividends from the proceeds of such sales, thus presenting the phenomenon of a corporation declaring dividends out of its own *capital stock*, and not out of its profits.—*New York Sun, October* 14.

Improvements in Kerosene Lamps.

THE annual destruction of life and property caused by the use of kerosene for illuminating purposes, has no doubt curtailed its use to a great degree. Owing to these facts the attention of both the manufacturers of the article and the designers of lamps for its use has long been engaged in devising means to prevent these disastrous consequences. Mr. O. M. CHAMBERLAIN, of this city, claims that he has obtained the desideratum, so long demanded by the public, by the construction of a lamp which renders it entirely safe, and non-explosive, even if the lamp is upset or broken. The principal feature of this lamp is the construction of a tube provided with two annular spaces, through which oxygen is conducted to the flame to support combustion; this can be used in connection with any of the ordinary burners. Another feature is the employment of absorbents, such as the chloride of sodium or other chlorides, in the oil chamber in combination with the tubes, so that if the lamp is upset or broken the oil is held by absorption, which prevents it from spreading or flowing, so that it can be easily extinguished in case it takes fire. This lamp was patented Oct. 11, 1870, through the agency of Messrs. WESTERN AND COMPANY, 37 Park Row, New York.

Road Locomotives.

In the ENGINEERING AND MINING JOURNAL of June 14th, of the present year, we gave an illustration of a traction engine, and at the same time gave a description of some of its good qualities. Since that time, a long and very interesting report of some trials made with the same traction engine manufactured by Messrs. AVELING & PORTER, of Rochester, England, have been made public. The trials were undertaken by M. TRESCA, for the French Conservatoire Imperial des Arts-et-Métiers, at the instigation of the Director, General MORIN, and were, moreover, made in concert with Professor FLEMING JENKIN, F.R.S., London, whose presence gives a character of reliability that increases their importance.

The question of "Steam *versus* Horses" for the conveyance of material along ordinary roads is now claiming so much the attention of the public that we give to our readers the salient points of this Report, as a means for obtaining information upon the more important requisites for a reliable road locomotive. There are at this time more than 500 of Messrs. AVELING & PORTER's traction engines in use in Europe, and they are doing their work of conveying material from place to place along ordinary roads at an immense saving as compared with the employment of animal power.

It appears, from M. TRESCA's report, that the engines with which the trials were made, drew upon a good road, with inclines in some places as great as 1 in 30, a total weight of 59 tons, of 2,240 pounds each, and also that the same engine drew on a level the enormous weight of 80 tons; and the report adds "that this was not the limit of what it could draw under the same conditions."

We refer our readers to this report, as being a reliable and carefully-compiled document, evidencing most certainly the practicability of using steam on common roads with great economy:

"The motive power of the engine consists of a single cylinder, 11 inches in diameter, with a piston stroke of 14 inches.

"The diameter of the driving wheels being 6.50 feet, the ground gone over by every turn of the wheels should be 20.07 feet; and we shall see, in fact, by the numbers shown on the wheel indicator, that the actual ground passed over differs very little from this number. The width of face of the driving wheels is 18 inches; they each form a veritable roller, bearing upon a great surface, and preventing the destruction that might be found from the passage over them of so great a weight of macadamized roads.

"These wheels work free upon the axle, and are only keyed to it by means of a strong pin of 2.36 inches diameter at the projecting end, which it is necessary to draw out a short distance to unlock the wheels when going round curves. This mode of connection, as simple as it is strong, is exceedingly convenient, and appeared entirely to answer the purpose intended. The two front wheels are only 3 feet 8 inches in diameter, and 12 inches wide on the face, but when the engine is on a level road, they only carry 7-29ths of the total weight; those on the driving axle accounting thus for 22-29ths of this weight.

"The locomotive is, besides, provided with a fifth (steering) wheel in front, or rather a thin disc of 2½ feet diameter, which acts on the road by its own weight, and by that of a triangular frame, fixed, by means of a horizontal joint, on the front part of the engine. The weight of all this apparatus is 6 cwt. 1 qr. 16 lb. only. The fifth wheel cannot exercise any injurious action upon the ground; but slight as the friction is, it is sufficient for moving the fore carriage which carries it, guided by the hand of the steerer, and by a very slight effort, in any required direction. The entirely effectual arrangement of the steering wheel is not one of the least interesting features of the engine in question."

After giving a long and technical description of the locomotive boiler, and the large amount of heating surface provided—which, in a 14 horse-power engine, reaches 273¼ square feet—the report proceeds to detail the particulars of the load drawn, which in the aggregate amounted to 59 tons 14 cwt., and the distance travelled—from Beaurain to Senlis—was 7.45 miles, presenting inclines, in some instances, of 1 in 30. The report then proceeds:

"The facility with which this journey from Beaurain to Senlis (7.45 miles) was accomplished, led us to suppose that the limit of traction power had not been attained. It was believed that *two additional wagons* might still be attached, which Mr. AVELING had gone to fetch with the locomotive from the sugar factory at Beaurain. He set out at 3:25 P. M., and returned at 4:15 P. M., with another load, which was yoked on to the principal train.

"In consequence of this addition, the total weight of the load drawn was raised to 79 tons 19 cwt. 1 qr.* The adherent weight consisting of only 22-29ths that of the locomotive, we may call the total load, equal to 7.45 times the adherent weight.

"In spite of these unfavorable conditions, *the engine started very well, and hauled the load on level ground and up slight inclines of 1 in 250.*

"The care with which we registered the time of passing each kilometric post may appear excessive, but our motive was to ascertain convincingly if the engine, loaded as it was, had not slipped over any portion of the road. The total distance was 7.44 miles, and the counter marked 2.037 revolutions, which brings it to 19.29 feet of displacement per revolution. This figure is so near the exact figure, 6m. 12, that *it may be considered no abnormal slip took place*, the slightly observed difference not being greater than 4 per cent. of the external circumference of the wheel.

"To sum up: The engine 'La Ville de Senlis' drew in a regular manner, upon a good road slightly undulating, a total load of 59 tons. The co-efficient of traction may be approximately estimated at 1.40, which would bring the mean strain to nearly 39½ cwt., taking into account the weight of the locomotive.

"This mean effort, developed at a speed of 3.54 feet per second, brings the valuation of effective work to 15,623 foot-pounds per second, or to 27.61 horse-power. This figure will appear high if it be computed with the consumption of fuel, which was 3c. 2q. 13 lbs., (405 lbs.,) in three hours and three minutes—say, 122.15 lbs. per hour of actual travelling. This consumption represents only 4.49 lbs. of coal per horse-power and per hour.

"The corresponding consumption of water is not less than 132.22 gallons per hour of actual travelling. With the present tenders, which can hold 396 gallons of water, it is necessary to replenish them every 6¼ to 7½ miles. The co-efficient of adherence may be estimated on the road gone over at 0.3 of the adherent weight. The adherence resulting therefrom was only necessary for the working of the engines up inclines of 0.030 (1 in 33 to 1 in 30), and at starting.

"*The load of 79.919 tons, which the engine drew on level ground, is not the limit of what it can draw under these conditions.*

"A speed of 2.48 miles per hour appears suitable for traffic of this nature, and renders the manœuvres so easy that the train is well managed by a superintendent, an engine-driver, and an assistant solely employed to guide the steering-wheel in front.

"Done by the Engineer Sub-Director of the Conservatoire Imperial des Arts-et-Métiers. H. TRESCA.

"Approved—The Director, GENERAL MORIN.

"PARIS, 15th of January, 1868."

* NOTE.—M. TRESCA adds to his report some interesting facts in connection with "La Ville de Senlis" engine, furnished by Messrs. F. LALLOUETTE & Co.

From these it appears that the engine has only been worked half of the past season, but during that time "it has conveyed 2,460¼ tons of beetroot from the weighbridge to the factory, a distance of 2.48 miles. It drew each journey three wagons loaded with 24 t. 12 cwt. 0 q. 11 lbs. of beetroot, and the engines made four journeys and back, thus effecting the transport of 98½ tons per diem.

The expenditure of fuel was not more than 9c. 3q. (1,102 lbs.) of coal for the eight journeys, and the trains were well managed by a driver and two assistants.

Zinc, and its Manufacture.

A propos of the recent publication of the zinc manufacture by M. ED. FUCHS, and of the annual report (1870) of the largest zinc producing company in the world, we purpose to review in brief the history and position of the zinc trade. Although known as a substance whose mixture with copper produced brass, and though worked for this object from the fifteenth century, the ores of zinc failed to furnish the metal as a branch of industry until the nineteenth century. In England, so early as the sixteenth century, the metal was isolated by Paracelsus, but no further advance seems to have been made towards its economic application, until in 1805, after an extensive series of experiments to reduce the carbonate to the metallic state, a Belgian chemist, L'ABBE DONY, succeeded in obtaining the metal by sublimation. The rude apparatus in which DONY first accomplished the condensation of zinc has, with slight modifications, been largely employed ever since, under the name of the Belgian process. This apparatus was no other than a flower-pot, fixed in the side of his furnace, and having a hole pierced through, the better to observe the progress of the operation. In this recess the zinc deposited in little drops. The metallurgy of zinc was known. The flower-pot has been replaced by retorts, provided with moveable horn-like prolongations, in which the metal collects, the number and size of the retorts have been gradually increased, but the process remains to this day substantially as DONY left it.

Simultaneously with DONY's invention at Liége, a similar process was discovered in Silesia. The sinking for coal at Tarnowitz had disclosed vast beds of calamine, which though inferior in point of purity to the Belgian ores were of sufficient importance to create a new and flourishing industry. Here the reduction of the ore, previously pulverised and mixed with ground coal, was accomplished in a muffle, terminating at its upper extremity in a tube, which passed through an aperture in the side of the furnace, and, bending downwards syphonwise, allowed the condensed metal to flow out. The syphon form has, however, been abandoned in favor of a series of double recesses, in which the zinc collects, and is removed by a descending pipe into cast-iron cups. A third method was practised for some time in England, known as distillation *per descensum*, in which the ore was reduced in retorts or crucibles arranged on the shelf of a furnace of the ordinary glass-house form. Through the bottom of each crucible a pipe descended to the cool cavity underneath. This opening in the bottom of the crucible was closed at the commencement of each operation by a wooden plug, which, becoming converted into charcoal by the heat, allowed the zinc vapor to percolate through its pores, and run down the tube into the receiving vessel. This system, though it is said to yield good results, is wasteful in fuel, and is now generally abandoned in favor of one of the processes before mentioned, or some modification of them.

The first zinc works was established at Liége, by DONY, in 1807. It was supplied with ore from the calamine beds of Moresnet, of which he had obtained the lease. But DONY paid the price of most inventors—he enriched the world and impoverished himself. Finding the demand for the new metal increase so slowly, and his resources gradually diminishing, he was at length obliged to sell the lease of his rich zinc mines, after having worked them for eight years. These deposits of zinciferous carbonate have since acquired a world-wide notoriety in the hands of the Vieille Montagne Company.

The mining of the ores of zinc is by no means of so recent date as its metallurgy. So early as 1425 the annals of the Duchy of Limbourg mention the calamine explorations of Altenburg; and for a long time blende and carbonate of zinc have been mined, as secondary products, in Rammelsberg and other parts of the Hartz Mountains. The chief ores for industrial purposes are blende, a proto-sulphuret, and calamine, a carbonate of zinc, having very frequently an admixture of silicate. Though theoretically richer in metal than the carbonate, blende is more difficult in its treatment, and yields a less percentage to the manufacturer. The carbonate occurs both in veins and beds, in the Devonian measures of Ardennes, the Hartz Mountains, and the Erzgebirge, and among the limestones of Derbyshire and Cumberland, and in the transitional rocks of Hungary and Silesia. It sometimes forms the lining on the cheeks of lead veins, and sometimes is associated with the galena, in which case it is never very dependable, its continuance being often abruptly supplanted by blende, galena, or pyrites. This is especially the case in the zinc mines of Spain and in the newly-opened workings in Sardinia. Blende occurs chiefly as an alternative in lead mines, and sometimes in copper and other metalliferous veins, but it is occasionally found in masses, like the Cornish "floors" or the German "stockwerk," as in the rich mines of Iglesias, in Sardinia, and of Stollberget and Ammeberg, in Sweden. Above half of the zinc ores of Europe is supplied by Prussia. In Silesia there are thirty mines in operation, partly worked by shafts and partly by levels driven into the hills. They employ fifteen thousand workmen, and yield annually 221,000 tons of calamine. In Westphalia 70,000 tons are supplied from seventy-five works. The Rhine ores consist of blende, largely mixed with lead and iron. In some parts the iron reaches eighteen per cent. of the calcined ore, but no effort has yet been made towards its utilization. Here six thousand men are employed. Belgium, the oldest zinc-producing district, supplies 57,000 tons, Poland 12,000 tons, and Spain 50,000 tons. These ores are chiefly the carbonate, containing portions of blende and galena. France contributes 3,000 tons, and Ammeberg, Sweden, 12,000 tons. The sulphuret from these Swedish mines is very pure, and admits of tolerably easy reduction. From Iglesias 20,000 tons come. This district in Sardinia has but recently become a producer of calamine. In 1866 the total quantity raised was 13,000 tons; increased in 1869 to the amount given above. Immense stores of calamine enrich Sardinia, and the supply seems to be only limited by the difficulties of transport, which, it is said, will prevent the annual yield from exceeding 40,000 tons. These Sardinian deposits are regarded as the only carbonates at all comparable, in point of purity to the far-famed calamine beds of Moresnet and Tarnowitz. America produces about 12,000 tons; but the disorganization of the civil war interrupted the annual reports after 1863 until recently. In Italy and other countries, including England and Algeria, where, at the present moment, a Belgian company is preparing to open out a zinc mine, 12,000 tons are raised.

In the metallurgy of zinc, the first point to be accomplished is its slow and uniform roasting. This is effected at present in a furnace, whose sole is divided into two or three compartments, of varying heats, and the ore is drawn from the first to the next, at intervals of about eight hours, in such manner that the mineral is first gently heated, and gradually increased to the utmost power of the furnace. A self-acting machine has been invented by M. GERSTENHÖFER, to avoid the immense hand labor involved in this operation. This apparatus is used in England and Belgium to some extent, but does not seem to fulfil all the desirable conditions, and the ore calcined is neither so uniformly nor so thoroughly roasted as by the hand method. From the calcination the ore is carefully ground, and mixed with coal dust. Coke dust is used in Silesia, to avoid the stoppage of the pipe that delivers the zinc from the muffle, by the adhesion of the tarry matters of raw coal. Here very little labor is required from the workmen; the zinc continues to condense and flow down the syphon to the end of the operation. In the Belgian process, however, when the ore has been placed in the retorts, and has begun to sublime, the horn-like prolongations are taken off every two hours, and carefully emptied into the receiver. The fact that this method requires a lower temperature than the Silesian process has been utilized in arranging some Belgian retorts above the ordinary Silesian furnace. This method has been established at the zinc works of VALENTIN COCQ, with a considerable economy of fuel. The cost or the Belgian and Silesian processes is about equal, the first having an advantage in fuel, and the second in hand labor and in the longer endurance of the furnace. The points to which attention is directed to reduce the cost of zinc production are, to augment the yield by increasing the size and number of the retorts, and to reduce the amount of fuel consumed. In the Belgian furnace it is customary to arrange seventy retorts, and from thirty to forty in the Silesian, the daily yield amounting respectively to 11 cwts. and 20 cwts. The fuel required in the Silesian furnace is 2½ tons of coal per ton of ore. Three-fourths of the metal contained in the ore is by these means extracted. With the object of still further reducing the expenditure of fuel, which in Prussia and Belgium is more costly than with us, various forms of grate have been tried for the reducing furnaces, with but partial success. An English patent taken out some two or three years ago, by Messrs. TILDESLEY & BIRD, seems to us most likely to answer the purpose. Furnace grates similar to Siemens' are used with moderate success in France and Silesia.

The metallurgy of zinc, like its mining, is confined to a few centres. In England the principal works are those of Messrs. VIVIAN, at Swansea, and these depend partly on foreign supplies of ore. The entire produce of Europe is 120,000 tons; of this Prussia contributes 80,000. The largest of the Prussian works is the Silesian Society of Mines and Foundries, which keeps in activity no less than 150 furnaces, and turns out annually 8,000 tons of raw zinc, and the same quantity of sheets. The cost of reducing operations at these works is 11s. 10d. per cwt. of zinc produced; and the selling price at the market town, some miles distant, has been for the average of the last few yeers 22s. 4d. per cwt. The extra cost for rolling is 1s. 3d. per cwt. of sheets. This price is slightly augmented in the case of the thinner varieties. The largest zinc works in the world is La Vieille Montagne, near Liége. Last year this company raised 68,379 tons of ore, and in their own two collieries 89,452 tons of coal, while the total manufacture of zinc attained the amount of 44,441 tons, of which 35,213 consisted of sheets, 5,965 of zinc-white, and the rest of various castings—ingots, wire, nails, ornaments, etc. The entire sales of this company last year, according to the official report of April 30, 1870, amounted to the sum of £1,000,000, being thirty per cent. of the entire produce of Europe, and resulting in a gross profit of £212,557, which allowed a dividend to be declared of twenty-five per cent. on the capital. At all these works sheet-zinc is rolled to any thickness. The plates are rolled at a temperature of about 212°, which heat is generally developed by the pressure of the process. The specific gravity is thereby increased—from 6.8 to 7.2.

Two-thirds of the total quantity of zinc produced is manufactured into sheets, the remaining one third is employed for brass making, for wire, for zinc-white, as a substitute for lead in paints, and for castings, which last, by the way, are made in moulds of iron instead of sand, thereby attaining a cleanness and finish before unknown, besides considerably reducing the expense of manufacture. That the consumption of zinc is far from having attained its normal development may be seen from the fact that while France consumes 35,000 tons annually, and Great Britain and her colonies 30,000, and Belgium 6,500, Germany uses but 22,000, Italy, Russia, Spain, and other countries together only 10,000 tons. The two chief requirements for zinc sheets are roofing purposes being from .028 in. to .044 in., while for ships' bottoms they range from .038 in. to .048 in. Mr. DAFT, an English engineer, has recently proposed an ingenious application of zinc sheeting to iron ships, whose chief advantage seems to be the avoidance of vegetable and animal growths on the bottoms of vessels by means of the galvanic current set up between the two metals when in the presence of salt water.—*London Mining Journal.*

THE ENGINEERING AND MINING JOURNAL.

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ROSSITER W. RAYMOND, Ph. D., Editor.

PUBLISHERS' ANNOUNCEMENT.

THE ENGINEERING AND MINING JOURNAL *is projected in the intent of furthering the best interests of the Engineering and Mining public, by giving wide circulation to orginal special contributions from the pens of the ablest men in the professions. The careful illustration of new machinery and engineering structures, together with a summary of mining news and market reports, will form a prominent feature of the publication.*

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Mining Literature Reviving.

IN the good old times of 1865 and 1866 the literature of mining attained an unprecedented glory and perfection, as any one may see by reading the prospectuses of the few thousand companies which were organized at that time, to distribute the blessings of stock-certificates through the community, which never knew what it had lost by being deprived of such advantages, but which possibly can now tell how much it has lost by the bestowal of them. The magnificent periods of these eloquent pamphlets ceased after a while to reverberate through the air. The stock was all sold, or had become unsaleable; and your true persuader of men will not waste his rhetoric upon empty benches or double-locked pockets. Then came a sad, sad time of comparative silence; the inhabitants of mining camps settled down in some degree to the prosaic work of actual mining. There were sales of machinery and buildings, fine horses and office furniture; people heard less about companies and more about blasting, hauling and crushing; Wall street and State street and Walnut street turned their attention to other forms of speculative philosophy; the brilliant but transitory splendor of mining literature faded.

But the Promethean fire can never be totally extinguished. Even in the darkest hours, an occasional gleam testified that the sacred glow was not quite dead; and it has lately broken out into jets of flame which, in one or two instances, almost eclipse the glory of the past.

For some reason or other, we are seldom honored with copies of the best productions in this line. Dry prosaic statements from some old fogy companies, who think it necessary to inform their stockholders annually of the number of tons of ore extracted, the expenses in each department, the receipts and balances—such uninteresting stuff we do receive now and then, and reluctantly impose on our readers; but the bright poetic effusions, the more than sublime prophecies, the stupendous accounts of prospective profits,—these gems are not to be wasted upon cold-blooded and impecunious newspaper editors.

It is therefore with a thrill of joy that we have discovered a collection of inestimable jewels in the form of preliminary reports from Colorado Tunnel Companies. Before adding them to the multitude of their predecessors upon our shelves—a galaxy of blazing beauty—we must devote a word or two of hearty commendation to some of the most precious among them. Our Colorado friend may modestly disclaim the prominence which we give to their Territory in this respect. Perhaps we do rate it too highly; but no one will deny that the single specimen which we shall now describe deserves to be exhibited at Denver or Paris, and will take the prize wherever it goes.

It is the pamphlet of the Philadelphia Silver Mining Company, one of the most successful dividend-paying—well, if you don't believe it, read the prospectus referred to.

The Philadelphia Silver Mining Company owns claims upon nine silver-bearing lodes, two tunnel sites and a water power, all near Georgetown, Colorado. The property, so far as we can learn from the prospectus, is absolutely undeveloped. One of the lodes, the Dunderberg, on Leavenworth Mountain, has a good reputation, partly because it has furnished a few pounds of rich ore at the surface, and partly (perhaps) because another Dunderberg, on another mountain, has likewise a good reputation. Of the rest of the claims, we know nothing; and we suspect the Company is in the same condition. The tunnels are relied upon to cut the lodes, and some ninety others, not belonging to the Company, but to which, it is declared, they will "acquire absolute title when reached, under the provisions of the Tunnel law of Colorado."

Now all this does not specially concern us. If people are foolish enough to consider a property of this kind worth $800,000, $100,000 or $10,000 or $5,000, that is their own affair. If the fact that out of the countless tunnels in Colorado not one has ever paid its cost, does not enlighten them as to this method of prospecting mines, they may as well learn by experience. What does concern us is the wholesale lying by which the visionary prospects of the present company are made to appear substantial. We can only take a few examples from the incredible number of false or garbled statements which fill these pages.

Page 7. "The rock in Leavenworth mountain is soft enough to be worked by hand-drills, thereby avoiding the expense of machinery, which is a great saving in developing mines.

"The history of silver-mining, in all countries, has demonstrated the fact that the deeper a mine is worked the richer the ore—and this is especially true in regard to the mines of Colorado Territory."

Page 8. "The great success and the large dividends of all tunnel mining companies will prove to the reader that it is the only way to mine successfully."

We pause to remark, first, that all the quartz-mines in the world are worked by hand-drills, machinery for drilling being thus far experimental, but intended to reduce, not increase, the cost of drilling; secondly, that the history of silver-mining in Colorado as elsewhere, establishes no general relation whatever between richness and depth; thirdly, that the history of Colorado tunnel companies, like this one, is a tale of almost uninterrupted and unmitigated disaster. The following extract needs therefore no characterization.

Page 13. "A number of tunnel companies have been organized during the last two years, and up to this time *there has not been a single failure in that vicinity, but all are in a prosperous condition, and paying good monthly dividends on their capital stock.*"

Page 18. "The mines of the Philadelphia Mining Company are located in the Griffith district, and, *as there is no difference* between the ores of these mines and those of its neighbors, the following statement, showing the condition of mines two or three years old, in the immediate vicinity, indicates what we may reasonably expect to accomplish."

Then follows a statement of dividends paid by different companies within two or three miles of the mines of this company. The Wilson & Cass Company is set down for $200 ores, and a monthly dividend of two per cent. coin, whereas that company's mines is closed because the ore will not pay for extraction and reduction; and the magnificent dressing works in which it was to be concentrated are under lease to other parties. The Schneider, Equator, Terrible, Brown and Baltimore Companies are credited, some with dividends that they never made, so far as we can learn, others with profits far greater than we have believed them to be realizing.

These reckless statements are supported by non-committal letters from citizens of Colorado, general statements from such scientific authorities as Commissioner TAYLOR and Professor HAYDEN, and two gentlemen, from Washington and Baltimore, who took the pains to visit the locality and be stuffed on the spot, when they might as well have staid at home and perused this pamphlet, saving their travelling expenses, and becoming quite as wise in the end.

Prof. HAYDEN has committed himself in another pamphlet of the same stripe—that of the Anker Silver Mining Company, to a vague favorable opinion of a similar undeveloped property. He says: "In endorsing your statement as to the wealth of Leavenworth mountain, I do not take upon myself any responsibility for mismanagement as the cause of failure. I simply express my faith, after a somewhat careful examination of your property, that it is very rich, and if wrought on strictly business principles will prove a success." The rest of his letter is equally indefinite, and the whole of it is one of those general opinions which few men are competent to give, and then only after thorough examination and long local experience. We have always praised Prof. HAYDEN as a geologist in certain departments of that field. His work on the plains we have considered to be thorough and trustworthy; but we are surprised to find him in the *role* of a mining engineer. We esteem him too highly to be pleased to see him in a false position.

But to return to the Philadelphia pamphlet. If this prospectus were merely over-sanguine, we should not single it out for critricism. In that case, we might feel inclined, without mentioning names, to address a few words of general warning to capitalists, concerning the policy of prospecting mountains by large cross-tunnels. It is beginning at the wrong end, and invites failure. But even if this policy deserves a trial, the part of wisdom is to await the results of *bona fide* experiments now in progress. The MARSHALL tunnel near Georgetown, for instance, has as much chance of succeeding as any similar enterprise. It under-runs well-known mines, and it has been managed by General MARSHALL with the greatest possible shrewdness, economy and energy. Nobody in Colorado can surpass him in these respects; and people who are wise and honest will watch for his ultimate results, before plunging into similar experiments. His tunnel is now some 900 feet long; the BURLEIGH tunnel is perhaps 700 feet long; innumerable other tunnels have penetrated to less distances. If failure consists in abandonment only, then they have mostly failed; if failure consists in non-success so far, then they have so far all failed. We shall hereafter take occasion to explain the true use and relative importance of tunnels in mining, and to explain more fully why they should not be employed in preference to shafts for opening new mines. But such a warning as this does not apply to an enterprise the very announcement of which bristles with the indications of insincerity and reckless misrepresentation.

As we have remarked, this company is one of the most successful *prospectusing* associations that ever paid the national debt. We have never had the pleasure, in our repeated visits to Colorado, of inspecting their mines; but they form a part of the wealth of Leavenworth mountain, all the lodes of which will sooner or later belong, by the Tunnel law of Colorado, to the parties who intersect them; and after a perusal of these pages, we have no doubt as to the parties. The Helmick Tunnel Company, which owns a tunnel alongside of the site of the Philadelphia company, sold to these fortunate parties the privilege which they now possess, and shortly afterwards declared a dividend of two per cent. monthly, commencing on the first of September last. This brilliant and prolonged success of the Helmick tunnel answers the question, "Does mining in Colorado pay?" We are sure that it does so, because the prospectus of another company (the Anker) says it does. The Anker prospectus tells us, moreover, that the Hemlick sold one of its tunnel-sites for $600,000, probably to the Philadelphia, and as the Anker people are located on the same mountain, they expect likewise to sell a site and declare a dividend. The vista of dividends thus opened is endless; and nothing could be clearer than the fact, that one thing only is required to pay dividends—namely, capital. We are not quite ready to agree with the Philadelphia prospectus, that "this is the only way to mine successfully;" for there are a good many mines about Georgetown that are doing pretty well on a different plan; but that is by all odds the quickest process, we have no manner of doubt.

Worthington's Duplex Pumping-Engine.

OUR English cotemporary, *Engineering*, has recently publishd the admirable engraving of this engine given some time since in our columns. At the same time they give credit to the ENGINEERING AND MINING JOURNAL for the general details which they publish in connection with the engraving, but can not understand "how the consumption of coal per hour should have been exactly four hundred pounds;" and the fact that the divisor 4 is taken, leads them to suppose that the consumption of coal was only taken approximately. In conclusion, they say that "the engines are of a class to which much interest attaches, and we hope, at some future time, to be able to place further particulars of their construction and performance before our readers."

When the article to which allusion is here made was published, we devoted as much space as we could conveniently spare to the subject; but since it has attracted greater attention, we cheerfully publish in another place the entire report of the experimental test which was made on the 25th of January last, at the Newark Water-Works. The economy and simplicity of a pumping-engine are the standards by which it should be judged, and hence we give this report to show that this engine really complies with the first of these qualifications, and refer the reader to our former article in proof of the latter, which, by the way, is fully recognized by *Engineering*. The fact that exactly 3,200 lbs. of coal were consumed in an eight-hour test does not seem to us remarkable.

If such data were figured down too closely, we should think that they had been doctored. In fact, such accuracy would be impossible, from the fact that nobody could be sure that each pound of coal placed in the furnaces had performed its entire work when the test was concluded. In other words, it is impossible to leave so large a fire in precisely the same condition that it was when the experiment began.

If the fire had been promptly quenched when the test ended, and the unconsumed coal separated from the ashes and carefully weighed, we should not have reached any more exact a result, as it would be impossible to say exactly how much coal was still unconsumed in the furnace, when the test began. It was not intended to show how much coal was required to get up steam and run for eight hours, but simply when an ordinary fire and an average pressure of steam were given, to find how much water could be raised to the required height in a given time, and how much coal would be required to do the work, and leave the fire and the pressure of steam in the boiler in the same condition, as nearly as possible, as when they started. The test was, doubtless, sufficiently accurate for practical purposes.

American Institute of Architects.

FOURTH ANNUAL CONVENTION.

THE Annual Convention of the Institute will be held this year in Philadelphia, Pa., on the 8th of November. The exact location, and time of holding the sessions, will be announced hereafter, if possible. The Institute invites all practising architects throughout the country to attend as guests, and to take part in the discussions. Important questions, affecting the practice of architects, will be discussed, and it is expected that the Board of Trustees will offer a special report on competition, recommending a schedule of terms according to which competition should be conducted. It is hoped that this vexed question of competition will meet with a practical solution, and that some scheme may be adopted by the Institute, and recommended to the architects, which will forever prevent the wrangling and bad feeling constantly stirred up between architects and committees, which arise mainly from a misunderstanding of their relative positions.

EDITORIAL CORRESPONDENCE.

Smelting in Colorado.

CENTRAL CITY, COLORADO, Oct. 4, 1870.

THE display of Colorado ores at the late Denver fair was a highly creditable and encouraging one. But of course a collection of specimens proves nothing as to actual present development and production, though it may promise brilliant things hereafter. The most significant single specimen was the huge block of coal, said to weigh five and a half tons, from Marshall's mine, near Golden City. Another mine (Murphy's) furnished a single lump weighing two or three tons. The Marshall vein is fourteen feet thick, of which thirteen feet are workable coal. The question whether this coal can be used in metallurgical operations is an important one, and the answer is, I regret to say, somewhat doubtful. The analysis published of the Marshall specimen (by whom made I do not know) gives but 3 per cent. of ash and 3 per cent. of water, the rest being put down as fixed carbon and hydro-carbon. Believing the coal to be lignite, I cannot believe it to be so nearly anhydrous. All lignites contain considerable water in chemical combination; and I fear that in this analysis the coal was merely dried, and the loss in weight set down as water, while the chemically combined water, passing off in the subsequent distillation, was reckoned with the hydro-carbon. The error, if such it is, is a vital one. The water in lignites not only decreases the amount of actual fuel, but by evaporation absorbs heat in the furnace; and it may be, consequently, difficult, or even impossible, to maintain high smelting temperatures with such fuel economically.

Some experiments already made have resulted both ways; but the favorable results, so far as I can learn, were obtained on too small a scale to be perfectly satisfactory, while the unfavorable ones may possibly be due to the employment of the ordinary grates and fire-bridges used for wood, which are, of course, somewhat unsuitable. Decisive tests have yet to be made; meanwhile, I am inclined to believe that the coal can be used successfully in gas-furnaces with regenerators, and perhaps not otherwise. One thing is certain, it is excellent for all domestic purposes, and for the generation of steam; and I hope it may soon be furnished so cheaply as to supersede wood for these applications. This would make the supply of wood and charcoal for furnaces last much longer than it will at the present rate of consumption. However, it should be added that there is no lack of wood in the Rocky Mountains. The trouble is that it speedily thins out in the neighborhood of towns and metallurgical works; and the prices of labor and hauling are such as to make it expensive when brought from a distance. I hardly think, nevertheless, that the prices of fuel will rise beyond present figures at this place for some time to come. I believe Professor HILL, at Black Hawk, pays from $5 to $7 per cord for wood, and say 13 to 15 cents per bushel for charcoal.

The Professor, by the way, seems, after much early expense and trouble, to have built up a splendidly profitable business. The supply of ores now at his establishment is more abundant than I have known it to be at any one time hitherto. He is buying large quantities from the Cariboo and other mines in the newly re-opened Grand Island district; and he will probably have to erect another furnace to accommodate his increasing business. The general activity, in a small way, of individual mine-owners has enabled him to make good the deficiency caused by the stoppage of the most important gold mines of this locality. I refer to the series of mines on the Gregory lode, including the Smith and Parmalee, Briggs, Black Hawk, etc. The stoppage is caused by a quarrel about the division of costs of raising water, into the merits of which I cannot enter. The true remedy would be a consolidation of properties, making a truly magnificent mine; but this is probably impracticable at present, on account of the enormous nominal capital and the numerous and complicated relations involved, to say nothing of the passion and jealousies already aroused by the dispute, which forbid an amicable and equitable settlement.

To return to the subject of smelting, Professor HILL'S unquestioned success has aroused a good deal of interest, and many schemes of competition. Mr. WILLIAM WEST has small works nearly completed, in which he intends to treat auriferous and argentiferous ores by kiln-roasting and smelting in a cupola furnace. The plan is similar to that of the copper furnaces at Ducktown, Tennessee; but the greater proportion of iron-sulphurets in the Central City ores, and the different nature of the gangue, render the undertaking more difficult here. The furnaces themselves are substantially built, and the test of actual practice will not be long delayed.

Since last year a chlorination-work has been erected in this city, and is running, according to report, with success. The proprietors, Messrs. CASH & ROCKWELL, are unnecessarily secretive about their process. I believe they extract both silver and gold, in which case they probably employ a modification of the Plattner chlorination, obtaining a solution in brine.

The stamp-mills are not so busy as they were last year at this time, and I see no signs that they are doing any better work. Probably forty per cent. of the gold is all they extract on an average, except from surface rock.

Of schemes for smelting works there is, as I have marked, no lack. Chicago, Omaha, St. Louis, Kansas City, and the neighborhood of the Coal in this Territory are all spoken of as localities, and each has its partisans. Perhaps one or two real establishments may grow out of the general excitement on the subject. Of all places outside of the Territory, I think St. Louis offers the best opportunity. The great difficulty will be the supply of ore; and this I cannot feel at ease about. The people of Colorado are actually incapable of determining exactly what their mines will furnish. It is at this time, when the establishment of smelting works calls for regular production of ore, that the evils of the irregular system of mining hitherto pursued begin to be keenly felt. It is not only impossible to increase production at once, but even to estimate accurately what the production is likely to be. One is repeatedly told that a reduction in the cost of treatment would instantly stimulate the mining yield; but this effect, though it undoubtedly takes place, is but gradual. The reduction of prices at the works of Georgetown, several months ago, by *fifty per cent.*, has not yet led to a larger yield of silver ores in that district.

But I do see a decided improvement in the year past, in the business-like spirit with which mining is being carried on; and I feel sure that the gain will be a permanent one. Smelting works at St. Louis could certainly compete, it seems to me, with Newark and Swansea, to both of which places ores and metal are now shipped from the Territory; and a few more years of such genuine industry as that of the last two, will establish a vast and well-regulated combined mining, and metallurgical industry in this section of the United States.

R. W. R.

Our Steel Manufactures.

THE "CODORUS ORE."

WE have occupied a day at York, examining the celebrated Codorus process. Having committed ourselves to a good opinion of the Bessemer and the Siemens-Martin, whatever we may say adversely to the Codorus will doubtless be attributed to anything but candor. At the very outset, then, let us make a single statement, which will enable the reader to judge how far we are likely to be influenced by any such prejudices. If the Codorus ore possess any such qualities as are claimed for it by its representatives, the use of it in the Bessemer process will at once reduce the cost of making Bessemer steel at least fifteen per cent. by rendering practicable the use of cheap irons and fuels, and would lead to the indefinite expansion of the Bessemer process by establishing works where it is now commercially impossible to do so. The Siemens-Martin process would profit by this discovery in a less degree, but still considerably. Now let any man of sense judge whether a good opinion of the Bessemer and Siemens-Martin is likely to engender any unwarrantable prejudice against the Codorus.

THE MERITS OF THIS ORE.

Prior to our visit to York we had daily been inquired of respecting this ore by many who had been induced to attach credit to certain articles in the *Tribune*. The extended circulation of that journal, and its editorial endorsement of this supposed discovery, had given it a publicity seldom attained by metallurgical enterprises. We therefore deemed it proper to make a thorough investigation of it, and think we have gauged its merits. It is claimed that the use of this ore in the pudding-furnace will render practicable the production of a steel suitable for railway tracks at a cost of $60 to $80 per ton; in other words, as cheaply or more cheaply than iron. Let us see. In order to comprehend the intrinsic probability of this claim, let us begin with an analysis of the ore, which is said to be as follows:

Oxide of iron	45.22	Titanium	None.
Silica	46.38	Chromium	None.
Potash	3.00	Water or organic matter	2.20
Manganese	.20		99.63
Alumina	Trace.	Iron	31.93
Lime	1.29	Oxygen	13.33
Magnesia	1.30		
Sulphur	.02		
Phosphorus	Trace.		

The two last proportions indicate the common peroxide, with small quantities of limonite and magnitite. The ore, upon ocular inspection, is a grey schist, with grains of magnatite interspersed. It is found in various localities, and very abundantly at Johnstown, Pennsylvania. The above analysis was made in Boston, and agrees tolerably with another furnished us at York. Probably both analyses exhibit too much silica and too little alumina or magnesia—an inference made upon purely mineralogical grounds; still they agree well enough with the external appearance of the ore, and I have no doubt indicate very well its general character. An analysis is now making by Dr. WUTH, of Pittsburg, which will command confidence. It is, therefore, a lean, silicious ore, and its effect in the furnace is to generate a large quantity of silicious and thinly fluid slag; the quantity varying, however, with the manner of working and the kind of flame employed. A thin slag generally improves the welding quality of the iron made in it, because it removes all the oxide of iron which may be formed, and makes the metal very soft at the welding heat. Beyond this I am not aware of any beneficial effect from it. Iron-makers generally avoid the use of silicious slags, because they lead to great waste and loss in puddling.

METHODS OF USING THE ORE.

There seems to be no fixed method at York of using this ore. Several have been tried and abandoned. We found it applied in two ways: First, by melting pig-iron in a cupola with about fifteen per cent. of the ore running the metal into second fusion pigs, and afterward refining in the reverberatory furnace; or simply puddling. It is claimed that the ore "purifies" the iron in the cupola, and enables it to make good steel. Now, the purification amounts to this: All founders are well aware, and take advantage of the fact, that every time pig-iron is remelted, it becomes more mottled or white, showing a loss of carbon and silicon, and, perhaps, other impurities. But the elimination of these substances is inconsiderable, and if it be intended to puddle afterward, this preliminary melting is just so much trouble and expense thrown away, for the puddling removes all but the last traces of impurity, while the cupola removes none worth speaking about. As for any special effect of Codorus ore, it is sheer nonsense; you might as well throw your hat and boots into the furnace. We were shown specimens of the iron both before and after fusion. It was claimed that the former contained two per cent. of phosphorus, and we take the liberty to doubt the last half of the statement, especially as there is no good reason why the phosphorus should be removed to any practical extent, and many why it should not. We were also shown specimens of steel made by melting up Bessemer ingots containing phosphorus. As these specimens showed no cold shortness, we were expected to infer that the phosphorus had been removed by the agency of the Codorus ore. Why! the whole theory and practice of puddling consists in the fact that puddling removes all impurities, phosphorus included; and with what kind of logic can anybody maintain that this adventitious substance produces an effect which is sure to take place, whether it is present or not? We have all heard the story of the fellow who attributed his "illness" not to the whiskey, but "the d—d nutmeg that was in it."

The first method then consists in melting pig-iron in the cupola furnace with the ore, running the metal into second fusion pigs, and making from these a puddled steel, in a reverberatory furnace in the ordinary way. The second method consists in omitting the cupola altogether, and charging the original pigs with twenty per cent. of Codorus ore directly into the puddling furnace, and working the charge in the ordinary manner for puddling steel. Now what is puddled steel? Cast-iron is converted into wrought-iron by the oxidation of its impurities. This oxidation commences as soon as the charge begins to melt. The hearth of the furnace is lined with iron ore, (oxide of iron) which readily yields up its oxygen to the impurities. There is also admitted with the blast a large quantity of atmospheric oxygen, which assists the conversion. As the iron becomes purer, it becomes less fusible, and the heat must be raised in order to keep it fluid. At length a stage is reached when it is no longer possible to maintain fluidity, and the iron at length separated from the slag in a manner strongly suggestive of the appearance of butter separating from the buttermilk in the churn. This solidification of the iron is called "coming to nature." It is evident that this change can be accelerated or retarded by varying the heat of the furnace. Increased heat will retard it, and diminished heat accelerate it. The longer the iron is kept fluid and subjected to the oxidizing flame, the purer it will be. But if it come to nature earlier, it will contain some of its original carbon and have the chemical constitution of steel. Puddled steel, then, is made by reducing the temperature of the blast, in order to bring the iron to nature before the carbon is exhausted. It is also essential to stir the metal under the slag, in order to prevent the too rapid oxidation of the iron, and consequent loss. It is also necessary to work the latter part of the heat with a reducing flame; *i. e.*, a flame containing little or no free oxygen, and for the same reason as the preceding.

Now this is the method followed at the Codorus works. It is the method followed wherever puddling steel is made, so far as I am aware, without exception. The product yielded at York is a fair article of puddled steel apparently, no better and no worse than it is made elsewhere at a dozen different establishments throughout the country. But what is the effect of Codorus ore on this process? It simply melts and forms an abundant slag on the surface of the metal, giving off a little oxygen and forming a silicate of the protoxide of iron. In making puddled steel it is best to keep a heavy slag on, and this is usually done by throwing in hammer slag or forge-cinder, which has the same constitution as Codorus ore almost to exactitude. In a word, the only function it performs is to act as a liquid covering to the metal, preventing a too rapid oxidation by the blast, and this is precisely the same office as is performed by forge-cinder. It is, of course, claimed that there is a mysterious action of the ore upon the impurities of the iron, and the gentlemanly inventor informed us that there was an "allotropic state" (!) of the silica, by virtue of which it drew out all of the impurities. This cabalistic word did not annihilate us, and we were by no means satisfied with an appeal to mysteries. The alleged virtues are not exhibited in the metal itself, which, as before stated, is an ordinary puddled steel. There is no reason whatever to suppose that the Codorus ore has any more necessary relation to it than the sign-board over the gate. Just as good an article is made by the same process without the ore at numerous establishments, and we are able to mention several where the ore has been tried without any beneficial results, as good a steel being yielded without it as with it, and some say a better article, *e. g.*: the Bethlehem Iron Works, the Abbot Iron Works, the Bailey Nail Works, and the Anderson Steel Works.

THE VALUE OF PUDDLED STEEL.

I do not mean to say that the metal made at York is a worthless, or even an inferior article, when compared with similar metals; but compared with a cast-steel it is very inferior. Of all steels, I hold the puddled variety to be the poorest. It has all the defects of both cast-steel and wrought-iron, with very few of the virtues of either. It is treacherous and deceptive, failing most when promising most—is never homogeneous and never uniform. When subjected to crucial tests it shows alternate hard and soft spots, and any one who is thoroughly familiarized by long and careful observation with the puddling process, will see that it must inevitably be so. Its chief value is for melting and conversion into crucible cast-steel, and I am happy to state that most of it is disposed of in that manner. It is necessary, too, to caution the inexperienced against attaching much credit to hand specimens of steel, whether cast or puddled. It exhibits many anomalies; *e. g.*, it will bend double cold and endure every possible proof, and yet, if improperly made or treated, will snap like a glass. I have known a sheet of boiler-steel folded double and quarto, and yet that very sheet had cracked through and through in riveting, for no conceivable cause. This has happened repeatedly. The only true test of steel is long experience in its practical use. No ordinary shop or anvil testing can be equivalent to the wear in a railway track or machinery, and no steel can be warranted with any pretense of security until it has been subjected to protracted practical service. But of all steels the puddled vari-

ety has failed most disastrously from time immemorial. It has been repeatedly manufactured in many places, but has invariably been discontinued. Neither steel-makers nor steel-users have any confidence in it except in very few and very special cases; and I speak the minds of four experienced investigators when I assert that there is not a shadow of reason to believe that the York steel will prove any better. The ore is sold at the mine at $8 per ton! The opinions of the distinguished metallurgists with whom I have the honor to be travelling is, that its chief value consists in helping "hold the world together." We shal next visit the Pennsylvania Steel Works, at Harrisburg, and the great Cambria Iron and Steel Works, at Johnstown.—*New York Times.*

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108,311.—GANG-PLOW.—Carell Atwood, Lebanon, Ill.

108,312, antedated October 11, 1870.—FEED DEVICE FOR POWER-PRESS.—Phineas E. Austin, New Haven, Conn., assignor to himself and Leander Buell, same place.

108,313.—DUMPING-CAR.—Andrew J. Ballard, Cohoes, N. Y.

108,314.—FOLDING-CHAIR.—Emil Bartels, New York, N. Y.

108,315.—COMBINED COLLAR AND CUFF-BOX.—Jacob C. Bauer, New York, N. Y.

108,316.—DOME-TOP STOVE.—Philo D. Beckwith, Dowagiac, Mich.

108,317.—VIADUCT.—Charles Bender, Phœnixville, Pa.

108,318.—LIQUID-COOLER FOR COOLING LIQUIDS UNDER PRESSURE.—Edmund Bigelow, Springfield, Mass.

108,319.—MACHINE FOR BOARDING LEATHER.—Milton B. Bishop, Whitingham, Vt.

108,320.—COTTON-PRESS.—Sinclair Booton, Seguin, Texas.

108,321, antedated October 1, 1870.—BOX-SCRAPER.—James Richardson Brown, Cambridgeport, Mass.

108,322.—BOX OR CASE TO CONTAIN BACON, HAMS, SIDES, &c.—Morgan W. Brown, New York, N. Y.

108,323.—ELASTIC SHAFTING.—Robert Brown, Detroit, Mich.

108,324.—ELECTRIC BLASTING-FUSE.—Charles A Browne and I. S. Browne, North Adams, Mass.

108,325.—LATHE-DOG.—Charles Buss, Marlborough, N. H.

108,326.—TRIP-HAMMER.—John C. Butterfield and James Hay, Chicago, Ill.

108,327, antedated October 4, 1870.—ROTARY GRATE-BARS.—D. Byard, Sharon, Pa.

108,328.—SUPERHEATER FOR GAS-WORKS, &c.—Mills L. Callender, Brooklyn, N. Y.

108,329.—SUBSOIL PLOW.—Leonard Carleton, Pomeroy, Ohio.

108,330.—WRENCH.—James F. Cass, L'Original, Canada.

108,331, antedated October 15, 1870.—FORMING CIGAR-TIPS.—Seth L. Cole, Brooklyn, N. Y.

108,332.—CONSTRUCTION OF WATCHES.—Daniel G. Currier, Waltham, Mass.

108,333, antedated October 4, 1870.—SECTIONAL STEAM-GENERATOR.—Byron Densmore, New York, N. Y.

108,334.—ROOFING FABRIC.—Drake W. Denton, Ithaca, N. Y.

108,335.—VISE.—Alexander Dick, Buffalo, N. Y.

108,336, antedated October 15, 1870.—FLUTING-MACHINE.—C. Dion, New York, N. Y.

108,337.—FINISHING COPPER-PLATES.—Benjamin F. Dudley, Boston, Mass.

108,338.—SNOW-PLOW.—Alexander Dunbar, New York, N. Y.

108,339.—LAMP.—John Dunn, New York, N. Y., assignor to Holmes, Booth & Haydens, Waterbury, Conn.

108,340.—MECHANICAL MOVEMENT.—Augustus Eckert, Trenton, Ohio.

108,341.—WHEELBARROW.—James Ennis, Columbus, Ga.

108,342.—RAILWAY-TRACK.—John N. Farrah, Pepperell, Mass., and Jacob Stone, Belvidere, N. J.

108,343, antedated October 15, 1870.—SOCKET FOR LOCK-SPINDLE.—Owen Gallagher, Boston, Mass.

108,344.—WATER-METER.—Othniel Gilmore, Raynham, Mass.

108,345, antedated October 5, 1870.—SAFETY-VALVE.—Henry A. Go'l, Chicago, Ill.

108,346, antedated October 8, 1870.—MATCH-SAFE.—Charles Go'dthwait, South Weymouth, Mass.

108,347.—CLOVER HULLING ATTACHMENT TO THRASHING-MACHINES.—Jacob H. Golladay, New Lisbon, Ohio, assignor to himself and J. W. Wnidden, Rockford, Ill.

108,348.—WINDOW AND DOOR-SCREEN.—David Goodwillie, Chicago, Ill.

108,349.—COTTON-SEED AND GUANO-DISTRIBUTER.—James T. Graves, Wilson, N C.

108,350.—CORPSE-PRESERVER.—Howard V. Griffith, Altoona, Pa., assignor to himself, D. W. A. Belford, and J. M. Hileman, same place.

108,351.—HAND-STAMP.—Henry H. H. Grosskopf, Philadelphia, Pa.

108,352.—FIRE-ALARM THERMOMETER.—Augusta Guest, Brooklyn, N. Y.

108,353.—SELF-RELEASING DAVIT-RINGS.—Augustus Guild and William H. Pierce, Middletown, Conn.

108,354.—COMBINED EAVES-TROUGH AND LIGHTNING-RODS.—J. W. Hankenson and Winslow Baker, Minneapolis, Minn.

108,355.—TOBACCO-CASING MACHINE.—Edward Holbrook, Jr., Louisville, Ky.

108,356.—SPINNING-MACHINE.—Warren D. Huse, Gilford, N. H.

108,357.—WHIFFLETREE-COUPLING.—James Ives, Mount Carmel, Conn.

108,358.—SELF-ADJUSTING ROTARY COTTON-CHOPPER.—Stilman A. Jefferson, Franklin, Tenn.

108,359.—GUN-CHARGER.—Herman Kahn, Troy, N. Y.

108,360.—COMBINATION LOCK.—Friederich B. Kalkbrenner, Clinton, Mo.

108,361.—GUARD-BOLT FOR LATCHES.—Edward H. Kent, New York, N. Y.

108,362.—STRIKING MOVEMENT OF CLOCK.—Friedrich Kienast, Ansonia, Conn.

108,363.—ALARM LOCK FOR MONEY-DRAWERS.—George Kimball, Cleveland, Ohio.

108,364.—MOP AND SCRUBBER-HEAD.—William H. Kline, Jersey Shore, Pa.

108,365.—PUMP.—Adam Knecht, Ilchester, Md., assignor to Michael Knecht, Alleghany county, Md.

108,366.—BRAKE FOR LAND CONVEYANCE.—Wladyslaw Theodore Kosinski, Philadelphia, Pa.

108,367.—BORING TOOL.—William P. Lathrop, West Winsted, Conn.

108,368.—GATE.—Francis Livings, East Enterprise, assignor to himself and Peter Wycoff, Cross Plains, Ind.

108,369.—FERTILIZING COMPOUND.—Joseph M. Lowenstein, New Orleans, La.

108,370.—SAWING-MACHINE.—George W. Lombard, Westminster, Mass.

108,371.—MEDICAL COMPOUND OR LINIMENT.—John D. Love, Harrisburg, Oregon,

108,372.—TURBINE WATER-WHEEL.—Wm. V. Martin, Waverly, Ohio.

108,373.—BAKER'S TABLE.—Alonzo S. Maxwell, Dixon, Ill.

108,374.—DRILL AND HOLDER.—Ira McLaughlin, East Arlington, Vt.

108,375, antedated October 8, 1870.—PRODUCING CASTINGS DIRECT FROM THE BLAST-FURNACE.—John W. Middleton, Philadelphia, Pa.

108,376.—WEATHER-BOARD GAUGE.—Jonathan M. Milhollin, Champlin, Minn.

108,377.—COMBINED TOOL.—George H. Miller, Dyersburg, Tenn.

108,378.—WATER-CLOSET.—David Morrison and John D. Smith, New York, N. Y.

108,379.—BELT-SHIFTER.—Joseph E. Mutchler, Grand Rapids, Mich.

108,380.—PNEUMATIC STREET-CAR.—David Myers, Chicago, Ill.

108,381.—NUT-FASTENING.—Frederick Myers, New York, N. Y.

108,382.—NUT-FASTENING.—Frederick Myers, New York, N. Y.

108,383.—SCREW-DRIVER.—Abner Newton, Darby Creek, Ohio.

108,384.—CULTIVATOR.—Cicero P. Norton, Prairie City, Iowa.

108,385.—COOKING UTENSIL.—Elizabeth L. Packard, Stoughton, assignor to Lucius H. Packard, Boston, Mass.

108,386.—REFRIGERATOR.—Augustus H. Phelps, Trenton, assignor to Phineas E. Saunders and Mary E. Phelps, same place, and J. Cook, Detroit, Mich.

108,387.—MACHINE FOR MAKING ROPE.—William G. Pike, Philadelphia, Pa.

108,388.—AGING ALCHOLIC LIQUORS.—Hiram Purdy, Burlington, Iowa.

108,389.—OVEN.—John Rainey, Brooklyn, N. Y.

108,390.—BALANCE-PENDULUM FOR CLOCK.—Richard Robley Ramsdell an l George Albert Whitcomb, Marlborough Depot, N. H.

108,391.—GRAIN SEPARATOR.—William M. Redd, Hazel Green, Wis.

108,392.—CULTIVATOR.—Thomas M. Reed, Germantown, Ohio.

108,393.—WASHING-MACHINE.—Charles W. Reeder, Trenton, Mo.

108,394.—STEAM-GENERATOR AND HOT-WATER APPARATUS.—J. Rigby and Philip A. Palmer, Marietta, Ohio.

108,395.—APPARATUS FOR THE SUPPORT OF SKATERS.—Philip Jacob Schopp, Louisville, Ky.

108,396.—EARTH-CLOSET.—Hamilton Sherman Waverly, Pa.

108,397.—TAMPING DEVICE FOR BLASTING PURPOSES.—J. Shoemaker, Putneyville, Pa.

108,398, antedated October 12, 1870.—CULTIVATOR.—Henry M. Skinner, Rockford, Ill.

108,399, antedated October 1, 1870.—DESK, BUREAU AND CHURN POWER.—James J. Slater, Nicholsville, Ohio.

108,400, antedated October 1, 1870.—DUMPING-CAR.—Eben C. Smeed, Lawrence, Kansas.

108,401.—GYMNASTIC APPARATUS.—John Smith, St. Paul, Minn.

108,402.—RAILWAY CHAIR AND CLAMP.—Loyst J. Smith, New York, N. Y., assignor to himself and Henry D. Blake, same place.

108,403.—MEAL-CHEST OR BIN.—William B. Smith, Oskaloosa, Iowa.

108,404.—CAR-COUPLING.—Warren B. Snedaker, Phœnix, N. Y.

108,405.—HANGING MILL-STONE.—Henry P. Straub, Cincinnati, Ohio.

108,406.—TABLE.—Joseph Taft, Rockville, Conn.

108,407.—MACHINE FOR WASHING AND CLEANING COFFEE.—Sam. Thompson, Baltimore, Md.

108,408.—CUTTING AND ENGRAVING STONE, METAL, GLASS, &c.—Benjamin G. Tilghman, Philadelphia, Pa.

108,409, antedated October 1, 1870.—SHUTTLE.—Hamilton E. Towle, New York, N. Y.

108,410.—COOKING-STOVE.—Alvah Traver, Troy, N. Y.

108,411.—STRAW-CUTTER.—Melzer Tuell, Penn-Yan, N. Y., assignor to himself and Sylvester Bowers, same place.

108,412.—ROTARY STEAM-ENGINE.—William P. Vickery, East Auburn, Me.

108,413, antedated October 1, 1870.—HEATING TABLE FOR SILVERING GLASS.—Henry Balen Walker, New York, N. Y.

108,414.—LIFTING JACK.—Lorenzo D. Warren, Havana, Ill.

108,415.—COTTON PLANTER AND FERTILIZER-DISTRIBUTER.—B. H. Washington, Columbia county, Ga.

108,416.—SAFETY DEVICE FOR LAMP.—Henry Wallace Macrae, Washington, Green Plains, Va.

108,417.—FLOUR-BOLT FEEDER.—Edward J. Weaver, Sterling, Ill.

108,418.—HORSE-COLLAR FASTENING.—Edward L. Welbourn, Union City, Ind.

108,419, antedated October 8, 1870.—WAGON.—John W. West, Saylorville, Iowa.

108,420.—PAINT-BRUSH.—John Lake Whiting, Boston, Mass.

108,421.—THRASHING-MACHINE.—Hazen Whittier, West Roxbury, Mass.

108,422.—MILLSTONE-DRESS.—John P. H. Wohlenberg, Lyons, Iowa.

108,423.—BOILER-FEEDER.—A. R. Young, Red Wing, Minn.

108,424.—STONE CUTTING MACHINE.—Hugh Young, Middletown, Conn., and James L. Young, New York, N. Y.

108,425, antedated October 2, 1870.—TOOL FOR CUTTING STONE.—Hugh Young, Middletown, Conn., and James L. Young, New York, N. Y.

108,426, antedated October 8, 1870.—STEAM-ENGINE.—Hugh Young, Middletown, Conn., and James L. Young, New York, N. Y.

108,427.—TREADLE MOTION.—Arthur M. Allen, New York, N. Y.

108,428.—TRUSS.—Horace R. Allen, Indianapolis, Ind.

108,429.—METHOD OF FORMING BICURFATED END OF RAILWAY-CROSSINGS.—Joseph Armstrong, Brinsworth, England.

108,430.—LANTERN.—Charles S. S. Baron and A. L. Baron, Bell Air, Ohio.

108,431.—CLOTHES-LINE OPERATOR.—Charles Barron, Lafayette, Ind.

108,432.—APPARATUS FOR CARBURETTING AIR AND GASES.—Abraham Bartholf, New York, N. Y.

108,433.—TREATING THE ORES OF LEAD AND ZINC FOR THE MANUFACTURE OF PIGMENTS, &c.—Eayre O. Bartlett, Birmingham, Pa.

108,434.—APPARATUS FOR LIGHTING AND EXTINGUISHING GAS BY ELECTRICITY.—Frank Bean, Somerville, assignor to Edwin C. Bean, Boston, Mass.

108,435.—MACHINE FOR CUTTING SOLES, &c., FOR BOOTS AND SHOES.—Joseph H. Bean, Marietta, Ohio.

108,436, antedated October 15, 1870.—TURBINE WATER-WHEEL.—Edwin R Beardsley, Aroma, Ill.

108,437.—MANUFACTURE OF OIL-CLOTH.—William Berri, Jr., Brooklyn, N, Y.

108,438.—SASH-HOLDER.—George W. Bishop, Saratoga Springs, N. Y.

108,439.—MACHINE FOR DRESSING SPOKES.—R. H. Boynton and Horace S. Boynton, Oshkosh, Wis.

108,440.—BLINDS FOR HARNESS-BRIDLES.—John L. Brown, Connellsville, Pa.

108,441.—HUBS FOR CARRIAGES.—Norman Bryan, Thomaston, Ga., assignor to himself and Wilson Sawyer, same place.

108,442.—ATTACHMENT TO MILLS.—Norman Bryan, Thomaston, Ga., assignor to himself and William Sawyer, same place.

108,443.—WINDOW.—Thomas Bullivant, Ledbury Road, Bayswater, England.

108,444.—PLOW.—William Thomas Bunn, Humboldt, Tenn.

108,445.—COTTON-SEED PLANTER.—Miles S. Burns, Memphis, Tenn.

108,446.—HOISTING-BLOCK.—Joseph A. Burr, Brooklyn, N. Y., assignor to Burr & Co., New York City.

108,447.—BED-BOTTOM.—Edwin L. Bushnell, Poughkeepsie, N. Y.

108,448.—MILK AND LIQUID COOLER.—A. P. Bussey, Westernville, N. Y.

108,449.—WORK-TABLE.—Fannie M. B. Clark, Wilmington, Vt.

108,450.—COTTON-BALE TIE.—Michael R. Clark, Columbia, S.C.

108,451.—COMPOSING-STICK.—Augustus F. Cloudman, Brooklyn, N. Y., and George W. Coffin, Charlestown, Mass.

108,452.—STEAM FIRE-ENGINE.—Edward R. Cole and Henry S. Cole, Pawtucket, R. I.

108,453.—MEDICAL COMPOUND FOR HOG-CHOLERA.—Thomas L. Cotten, Madison county, Miss., assignor to Martha J. Cotten, same place.

108,454.—BOAT-DETACHING APPARATUS.—John C. Cottingham, Philadelphia, Pa.

108,455.—PEN.—Germond Crandell, Washington, D. C.

108,456.—WASH-BOARD.—Aylett R. Crihfield, Lincoln, Ill.

108,457.—FOLDING-BEDSTEAD.—Mark Crosby, Boston, Mass.

108,458.—MACHINE FOR ORNAMENTING AND LETTERING LOOKING-GLASSES, SIGNS, &c.—William M. Davis, Brookhaven, assignor to himself and Sidney S. Norton, Brooklyn, N. Y.

108,459.—HEATING-STOVE.—L. De Haven, Allegheny City, Pa.

108,460.—CAR-STARTER.—David A. Dickinson, Baltimore, Md.

108,461.—COTTON-PICKER.—B. I. Dreeson, Marion county, Texas.

108,462.—TREATING COPPER PYRITES.—Cypren Marie Tessié, Du Motay, Paris, France.

108,463.—TABLE-CUTLERY.—Edward G. Durant, Northampton, Mass.

108,464.—VENTILATOR.—Edward J. Durant, Lebanon, N. H.

108,465.—HOE.—Augustin Ellis and Oliver Albertson, Salem, Ind.

108,466.—KEY FOR DOOR, &c.—Henry H. Elwell, South Norwalk, Conn.

108,467.—SELF-ACTING MULE, &c., FOR SPINNING.—J. Entwistle, Conshocken, assignor to himself and John Parkinson, Philadelphia, Pa.

108,468.—CORN-PLANTER.—Robert Erdly, Selin's Grove, Pa.

108,469.—MANURE-DISTRIBUTER AND SEED-SOWER.—Spencer Lee Fraser, West Town, N. Y.

108,470.—BED-BOTTOM.—Safford B. Freeman, Burlington, Iowa.

108,471.—CULTIVATOR.—Julius Gerber, Rockford, Ill.

108,472.—BEDSTEAD FASTENING.—Edward F. Gilbert, Lyons, N. Y.

108,473.—CHAIN.—John Good, Brooklyn, N. Y.

108,474.—COPPER PAINT FOR SHIPS' BOTTOMS, &c.—Thaddeus F. Griffin and Robert Tarr, Jr., Gloucester, Mass.

108,475.—CHANGEABLE-GAUGE CAR WHEEL.—Jonas Hamilton and George F. Morse, Portland, Me.

108,476.—COTTON-PLOW AND PLANTER.—John H. Hannon, Halifax, N. C.

108,477.—SPRING CUSHION FOR CAR-SEATS.—William B. Hatch, Elmira, N. Y.

108,478.—ADJUSTABLE HARROW.—A. Havens, Trenton, N. J.

108,479.—MACHINE FOR MARKING CARPENTERS' SQUARES.—Albert M. Healy, Berlin, Conn., and Charles H. Raymond, Woodstock, Vt., assignors to the Southington Cutlery Company, Southington, Conn.

108,480, antedated October 8, 1870.—WEATHER-STRIP.—Coleman Hicks, Lancaster, Ky.

108,481.—PERMUTATION-LOCK.—Julius C. Hintz, Jr., Cincinnati, Ohio.

108,482.—WATER-WHEEL.—David O Holman, Adams, N. Y.

108,483.—LADDER.—John Hughes, New Berne, N. C.

108,484, antedated October 15, 1870.—CORN-HUSKING MACHINE.—Milton C. Jeffers, New York, N. Y.

108,485.—SUBSOIL-PLOW.—John Harvey Johnson, Betonville, Arkansas.

108,486.—RUFFLING-ATTACHMENT FOR SEWING-MACHINE.—Allen Johnston, Ottumwa, Iowa.

108,487.—MANUFACTURE OF PAPER-STOCK.—Morris L. Keen, Jersey City, N. J., assignor to himself and Samuel A. Walsh, New York City.

108,488.—PLOW.—Horace M. Keith, Commerce, Mich.

108,489.—INSTRUMENT FOR CLIPPING OR SHEARING HORSES, &c.—Henry Knight, Ryde, Isle of Wight, England.

108,490.—POTATO-DIGGER.—Melvin W. Knox, Sheridan, N. Y.

108,491.—SHOE-FASTENING.—Harvey T. Lee, Marysville, Cal.

108,492.—RUFFLER FOR SEWING-MACHINE.—Arthur M. Leslie, Chicago, Ill.

108,493.—STRAP-BOLT FOR WAGON-BED.—William J. Lewis and Henry W. Oliver, Jr., Pittsburgh, Pa.

108,494.—IRON-SAFE.—Lewis Lillie, Clinton, N. J.

108,495.—ARRANGEMENT OF ELECTRICAL CIRCUITS FOR AUTOMATIC TRANSMITTING INSTRUMENT.—George Little, Rutherford Park, N. J.

108,496.—CHEMICAL TELEGRAPH.—George Little, Rutherford Park, N. J.

108,497.—WALL PROTECTOR.—Benjamin K. Maltby, Cincinnati, Ohio.

108,498.—EGG AND CAKE-BEATER.—Harriet S. Maltby, Cincinnati, Ohio.

108,499.—APPARATUS FOR SEPARATING GAS-TAR AND AMMONIACAL LIQUOR.—Edwin D. McCracken, New York, N. Y.

108,500.—COTTON-GIN.—R. McKenna, White's Station, Tenn.

108,501, antedated October 8, 1870.—SLIDE-DOOR FOR HEATING AND PUDDLING-FURNACE.—Samuel McLaughlin, Philadelphia, Pa.

108,502.—DIE FOR SWAGING WRENCH.—Thomas Meikle, Louisville, Ky.

108,503.—MORTISING-MACHINE.—Lowell G. Merrill, Angels, Cal.

108,504.—MEDICINE.—Ezra Miller, New York, N. Y.

108,505.—MANUFACTURE OF CONFECTIONERY.—George Miller and Charles B. Miller, Philadelphia, Pa.

108,506.—BOTTLE-STOPPER.—William Morgenstern, New York, N. Y., assignor to himself and Franz Otto, same place.

108,507.—BOAT-DETACHING APPARATUS.—Milton V. Nobles, Elmira, N. Y.

108,508, antedated October 8, 1870.—MEDICAL COMPOUND.—W. W. Oglesby, Benton county, Oregon.

108,509.—MANUFACTURE OF PAPER.—Charles E. O'Hara, New York, N. Y.

108,510.—COATING THE INTERIOR OF PIPES, TUBES, &c., WITH SILVER OR OTHER METAL, BY THE ELECTRO-DEPOSITING PROCESS.—Dubois Parmelee, New York, N. Y.

108,511.—BRICK-MACHINE.—Z. Phillips, Osseo, Mich.

108,512.—FASTENING FOR SHOVELS FOR CULTIVATORS AND PLOWS.—Joshua Pierpont and Sidney S. Tuttle, La Harpe, Ill.

108,513.—SWITCH FOR GALVANIC-BATTERY.—Edward M. Pierson, Newark, N. J., assignor to Edwin D. McCracken, New York, N. Y.

108,514.—MANUFACTURE OF SUGAR.—Juan Poey, Havana, Cuba.

108,515.—BACK-LASH FOR MILL-GEARING.—John L. Post, Ashley, Ill,

108,516.—GANG-PLOW.—Joseph L. Purcell, Thompson, Ill.

108,517.—BAKERS' OVEN.—John Kayney, Brooklyn, N. Y.

108,518.—COTTON AND CORN-CULTIVATOR.—Moses Reed, Little Rock, Arkansas.

108,519.—CONSTRUCTION, JOINTLY, OF FIRE-BEDS AND TUYERES.—Philander H. Roots and Francis M. Roots, Connersville, Ind.

108,520.—BROOCH-FASTENING.—William Sackerman, New York, N. Y.

108,521.—MANUFACTURE OF WROUGHT-IRON.—Charles Sacré, Manchester, Stanhope, Perkins and William Smellie, Gorton, Kingdom of Great Britain.

108,522, antedated October 15, 1870.—STOP-VALVE.—R. Safely, Cohoes, N. Y.

108,523.—DYEING WOOLEN GOODS.—William S. Sanborn, Lewiston, Me., assignor to himself and Arthur A. Sanborn, same place.

108,524.—KITCHEN-BOILER.—W. B. Scaife, Pittsburg, Pa.

108,525.—VEGETABLE-CUTTER.—Henry Seib, New York, N. Y.

108,526, antedated October 8, 1870.—CHILDREN'S DINING-CHAIR.—Addison Smith, Perrysburg, Ohio.

108,527.—LAMP-CHIMNEY CLEANER.—Alpheus D. Smith, Grafton, Ohio.

108,528.—VAPOR-BURNER.—C. E. Smith, Columbus, Ohio.

108,529.—WATER-WHEEL.—Ira W. Snyder, Dryden, N. Y.

108,530.—MACHINE FOR MAKING HORSE-SHOES.—John H. Snyder, Troy, N. Y.
108,531.—STEAM-HEATER.—Daniel E. Somes and F. C. Somes, Washington, D. C.
108,532.—SEPARATING ATTACHMENT FOR HUSK-HACKLING MACHINE George B. Stacy, Richmond, Va.
108,533.—FRICTION-PULLEY.—J. Steger, New York, N. Y.
108,534.—DEVICE FOR HOLDING OPEN DOORS.—J. B. Sweetland, Pontiac, Mich.
108,535.—CHUCK.—John F. Thomas, Ilion, N. Y.
108,536.—BEE-HIVE.—Edward B. Turnipseed, Columbia, S. C.
108,537.—POTATO-DIGGER.—Nicholas Vandenburgh, Schuylerville, N. Y.
108,538.—SINK.—Samuel Walsh, New York, N. Y.
108,539.—ADJUSTABLE GEAR-WHEEL.—W. H. Ward, Auburn, N.Y.
108,540.—MANUFACTURE OF SOAP.—Alexander Warfield, Philadelphia, Pa.
108,541.—MACHINE FOR CLEANING AND SEPARATING GRAIN.—F. Wegmann, Naples, Italy.
108,542.—MANUFACTURE OF BOX, CARTRIDGE-CASE, &C.—C. S. Wells, Springfield, Mass.
108,543.—CARTRIDGE.—D. E. Williams, Davenport, Iowa.
108,544.—TIRE-SETTING MACHINE.—John H. Williams, Pleasant, Hill, Ohio.
108,545.—SLED-BRAKE.—James Willis, Mifflin, Wis.
108,546.—SEPARATOR OF THRASHING-MACHINE.—Aaron Wissler, Brunnerville, Pa.
108,547.—MECHANICAL MOVEMENT.—Jacob Woolf, Burr Oak, Mich.
108,548, antedated October 13, 1870.—TIME-TABLE INDICATOR.—Leander Wright, Rochester, N. Y.
108,549.—COMPOSING-STICK.—Robert Clark Young, Middletown, Conn., assignor to Oliver Franklin Grover, same place.
108,550.—TREATING SHELLAC.—August Zinsser, New York, N.Y.

REISSUES.

4,155.—HYDRANT.—William Bailey, Troy, N. Y.—Patent No. 48,504, dated July 4, 1865.
4,156.—AUGER.—William I. Ives, New Haven, Conn.—Patent No. 95,803, dated October 12, 1869.
4,157.—COOKING-STOVE.—Silas Hoffman La Rue, Allentown, Pa.—Patent No. 103,294, dated May 17, 1870.
4,158.—PRESERVING AND HARDENING WOOD.—John L. Samuels, for himself and Benjamin F. Josselyn, William B. Lake, George G. Burnett, Henry S. Dent, Mary A. Stirling, George W. Dent, Joel S. Josselyn, and Benjamin R. Nickerson, San Francisco, Cal., and Frederick T. Dent, Washington, D. C., and Henry J. Stone, New York, N. Y., assignees of John Lewis Samuels.—Patent No. 60,795, dated January 1, 1867.
4,159.—OCHERS FOR PAINTS.—David S. Wood, Tiskilwa, Ill.—Patent No. 106,643, dated August 23, 1870.

DESIGNS.

4,419.—ORNAMENTATION OF GLASS-WARE.—Charles Ballinger, Pittsburg, Pa., assignor to "McKee & Brothers, same place.
4,420.—CARPET-PATTERN.—Jonathan Crabtree, Philadelphia, Pa., assignor to John Gay, same place.
4,421.—CLOCK-CASE.—Robert Dunn, Brooklyn, N. Y., assignor to the Waterbury Clock Company, Waterbury, Conn.
4,422.—CLOCK-CASE SASH.—Samuel B. Jerome, New Haven, Ct., assignor to Samuel Peck & Co., same place.
5,423.—BOX FOR BUREAU.—Cheney Kilburn, Philadelphia, Pa., assignor to Kilburn & Gates, same place.
4,424.—SHOE.—George Henry Maynard, Berlin, Mass.
4,425.—FIRE-PLACE STOVE.—John Robbins Rose and E. Calely, Philadelphia, Pa., assignors to Samuel S. Sexton, Baltimore, Md.
4,426.—BUCKLE.—John E. Smith, Waterbury, Conn.
4,427.—KEY-RING TAG.—Nelson Stafford, Brooklyn, N. Y.

Report of the Chief Engineer of the Newark Water Works on the Duty of the Worthington Engine.

NEWARK, N. J., February 3d, 1870.

TO THE NEWARK ACQUEDUCT BOARD:

Gentlemen,—The pumping engine built for the Board by H. R. WORTHINGTON, is complete and in regular operation. As its acceptance and the final payment on the contract are contingent on the performonce by it of certain requirements, I have made a careful test of its capacity and performance, and submit the following report:

By the contract, a copy of which is herewith presented, the engine is "to be of capacity sufficient to elevate five million U. S. standard gallons, one hundred and sixty-five feet high in twenty-four hours, through seven thousand feet of thirty-inch main, and to perform this work when running at a piston speed not exceeding one hundred and ten feet per minute;" and it is further guaranteed to be in all respects equal to the pumping machinery of similar kind furnished by him for the Water Commissioners of the city of Charlestown, Massachusetts; to wit, in regard to economy in the use of fuel, oil, etc., cheapness of attendance, exemption from liability to accident, and excellence of material and workmanship.

The experimental test was made on Tuesday, January 25th. As the test was one of duty, or economical use of fuel, as well as of pumping capacity, careful observations were made of all essential points, at half hour intervals.

The pressure of steam in the boilers and at the engine was marked by gauges at each point. The state of the vacuum was shown by a guage attached to the engine. A pressure guage connected with the delivery pipe indicated the water pressure on the forcing side of the pumps, the height from the water in pump-well to centre of pressure gauge being indicated by a float and gauge-rod attached. The number of strokes of the engine were indicated by an attached counter, the length of the stroke carefully measured at intervals, as before stated, and the temperature of feed-water taken. The coal consumed was carefully weighed and noted.

The fires were started fresh at 9:24, A. M., there being at the time two pounds of steam in the boilers.

At 10:19 commenced running. At 10:54, the fires being in condition for fresh coal, the test commenced, with 39½ lbs. of steam at the boilers,

At 6:54 closed test with fires and water in the boilers, same as at starting, steam 38½ lbs.

Duration of test, 8 hours.
Consumption of Coal, 3,200 lbs.
Strokes of Pump, 21,776.
Average length of Stroke, 48.09 inches.
Strokes per minute, 45.366.
Average Steam pressure in boilers, 38 lbs.
Average Steam pressure at engine, 35.5 lbs.
Average Vacuum, 26.5 inches.
Average Water Pressure, 68.15 lbs.
Average distance from center water pressure guage to water in pump-well, 17.35 feet.
Total working pressure on Pumps, 75.68 lbs., equivalent height, 174.82 feet.
Average temperature feed-water, 132°.
Water in Pump-well, 48°.
Area of Plunger, 373.85 square inches.
Displacement per stroke, 10.4042 cubic feet.

It was the design to measure the actual delivery of the pumps by measurement of the reservoir, and for this purpose the water was shut off from the pipe leading to the city, and measurements taken at 10:19 and 1:22. A violent rain storm was prevailing at the time, and the measurement showed an excess of the calculated capacity of the pumps. As there was no means of determining what quantity of water was due to the rain fall, a second measurement was made this day.

The measurement of the reservoir for the observed time gave a delivery of 830,466 gallons. The measurement by capacity of pumps was 838,633 gallons, showing a loss of 8,167 gallons. A part of this loss is due to absorption by the banks, and a slight leakage which was found to exist through the gate on the main leading to the city. But allowing the same proportion of loss for the quantity pumped during the test of January 25th, would give the following result:

PUMP. Feb. 3.	LOSS. Feb. 3.		PUMP. Jan. 25.	LOSS. Jan. 25.	ACTUAL DELIVERY. Jan. 25.
838,638	: 8,167	: :	1,694,605	: 16,502	1,678,103

1,678,103 gallons delivered in eight hours, 5,034,309 gallons in twenty-four hours. The speed of each piston making 45,366 strokes per minute, as during the test is 90.9 feet per minute. The maximum speed by contract to deliver five million gallons in twenty-four hours is 110 feet per minute. At this rate of speed the pumps will deliver in the reservoir 6,092,123 gallons in twenty-four hours, an excess over the contract requirement, if the actual delivery is taken, of 1,092,123 gallons in twenty-four hours.

The engine was guaranteed to be equal, in all respects, to the Charlestown engine. I understand there has never been a formal test of the duty of that engine, the Commissioners being satisfied with its performance without such test.

From the Charlestown reports of 1866 and 1868 the following results are gathered:—In 1867, the engine, running an average of 6.06 hours per day for the whole year, raised 54,565 gallons one hundred feet high, with one hundred pounds of coal. In 1868, running an average of 8.06 hours per day, the performance was 56,698 gallons raised one hundred feet with one hundred pounds of coal. In both cases the engine is charged with all the coal used, including that for keeping and raising steam, as well as that consumed during the actual working.

It is apparent that an engine running continuously, when all the coal consumed is performing some actual work, will show a better result than when a part of the fuel is used to raise and keep steam whilst the engine is lying still. The Charlestown engine, if run continuously at the same rate of consumption as for the actual running time, would raise 75,332 gallons one hudnred feet high with one hundred pounds of coal, deduced from the measured capacity of the pumps.

Taking the performance of the Newark engine in this test, we have the following result:

$$\frac{\text{Gallons per stroke.} \times \text{Stroke per hour.}}{4} \times \frac{\text{Gallons 100 ft. high with 100 lbs. coal.}}{100} = \frac{77.82 \times 2{,}722}{4} \times \frac{174.82}{100} = 92{,}578$$

Making liberal allowances for losses and wastes which might occur in constant running, it will be seen that that the performanee will still be in excess of that of the Charlestown engine. In the matter of cheapness of attendance and exemption from liability to accident, the engine being of the same construction, there is no difference, and in regard to excellence of material and workmanship, it is certainly equal, and in many respects superior. I believe the contractor has spared no pains to make it a first-class engine, and fully believe he has succeeded in furnishing the most perfect and economical pumping engine in the country.

For proof of this I append the reports of some of the most economical working engines in the country. They are extracted from a report made by the Engineer of the Brooklyn Water Board, giving the result of experiments for testing the duties of five different engines, as follows, expressed in pounds of water raised one foot high with one hundred pounds of coal:

Brooklyn (first engine) double-acting beam	60,140,700
Belleville (Jersey City) Cornish	62,823,300
Hartford, 3 experiments, Crank	58,779,300 to 64,699,400
Cambridge, 2 exp., Double Cyl. Worthington (not duplex)	66,941,100 to 67,574,600
Spring Garden, Philadelphia, Cornish	58,905,304

The same mode of conducting these tests was adopted as with our engine, in each case the duty being the effectiue duty, or actual delivery in the reservoirs.

The duty of this engine is thus stated:

$$\text{Area of Plunger.} \times \frac{\text{Pressure in pounds.} = \text{Load in pounds.} \times \text{Plunger moved. Feet per hour.}}{\text{Coal consumed, 400 lbs. per hour.}} = \text{Duty.}$$

$$373.85 \text{ sq. in.} \times \frac{75.68 = 28{,}293 \times 10{,}908.4}{\text{Coal consumed, 400 lbs. per hour.}} = 77{,}147{,}840$$

or in another way, thus:

$$\frac{\text{Cubic ft. displacement, per stroke.} \times \text{Strokes per hour.} \times \text{Lbs. cub. ft. of water.} \times \text{Height in feet.}}{\text{Coal consumed, 400 lbs. per hour.}} = \text{Duty.}$$

$$\frac{10.4042 \times 2722 \times 62.5 \times 174.82}{\text{Coal consumed, 400 lbs. per hour.}} = 77{,}358{,}478$$

As the loss of water in delivering to the reservoir, amounts, as before shown, to about one per cent., that amount should be deducted from these duties for actual delivery, giving 76,386,262 and 76,584,894 by the two modes respectively.

The engine is thus shown as performing a better duty than any of those before given, and these were selected as being the best of the several kinds.

It is performing all the requirements of the contract, and the coutractor is entitled to the twenty per cent. retained as a guarantee, and the order for the second engine, as the contract provides. Respectfully submitted.

(Signed) G. H. BAILES, Engineer.

BUSINESS AND PERSONAL.

[*Short notices in this column fifty cents per line each insertion.*]

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April 19 tf

IMPORTANT TO INVENTORS.

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CHARLES ROGERS, Solicitor and Manager.

In connection with the publication of the ENGINEERING and MINING JOURNAL and the MANUFACTURER AND BUILDER, we have frequently received applications from subscribers and patrons to act as their agents in transacting business with the United States Patent Office; and in view of the increasing number and urgency of such requests, we have resolved to add this department to our business. We have accordingly organized

A COMPLETE PATENT AGENCY,

and now offer our services in procuring patents in this and foreign countries, and transacting all business relating to the obtaining of patents.

Being possessed of superior facilities, in connection with our associate attorneys in Washington and foreign countries, for the successful prosecution of this business, we do not hesitate to guarantee satisfaction to all who may entrust their business to our care.

We have engaged as solicitor and manager Mr. CHARLES ROGERS, a well-known expert in this department. Being a practical mechanic, and having been an examiner in the Patent Office at Washington for a number of years, besides enjoying an experience of more than twenty years as a solicitor of patents, Mr. ROGERS is intimately acquainted with all the details of the business, both in and out of the office.

The specifications, drawings, etc., prepared in our office, will be found to compare favorably with those prepared by any other establishment, while the intimate acquaintance of our manager with the routine of business in the Patent Office, gives us a decided advantage in managing difficult cases.

We are fully prepared to prosecute Rejected Cases and Cases in Interference and Infringements, and also to procure Reissues and Extensions of Patents.

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Our charges are as moderate as those of any other responsible patent attorneys, as will be seen from the following figures: For preparing a case (whether simple or complicated) and attending to its passage through the Patent Office, our fee is from $30 to $40, which includes all the necessary papers and drawings. If the application is rejected we make no further charge, but prepare all necessary amendments, and, if requisite, appeal to the Board of Examiners-in-Chief. Most Patent Attorneys make an additional charge on each adverse action of the Patent Office, but we have found it more satisfactory to all parties interested to make our full charge at first; and as we expect no contingent fees, it is to our interest to prepare our cases properly at the commencement, thus avoiding annoyance to ourselves and delay in getting out the patent.

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For first Government fee, stamp, etc	$16
" our fee	$30 to 40
" final Government fee	20
Total	$66 to $76

If the case has to be appealed, the applicant pays the Government fee on appeal, $10; but we shall ordinarily make no additional charge for our services. The first two items are payable when the application is sent in, and the second Government fee when a patent has been allowed. Before an appeal is taken, in any case, the applicant will be fully advised of all facts and charges, and no proceedings had without his sanction; so that all inventors who employ our agency will know in advance what their applications and patents are to cost.

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In advance, on receiving the case	$10
When the patent is allowed	$20 to 30
Total	$30 to $40

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Our fee is	$15
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Total	$25

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MISCELLANEOUS.

OFFICE OF THE WILKESBARRE COAL AND IRON COMPANY, No. 80 Broadway, NEW YORK, Oct. 19, 1870.

A SPECIAL MEETING OF THE STOCKHOLDERS of this Company will be held at the office of the Lehigh Coal and Navigation Company in Philadelphia, on FRIDAY, Nov. 4, at 1 o'clock, for the purpose of obtaining their consent to the sale of nine thousand (9,000) shares of the Company's stock, received in payment for certain property of the Company, sold by their authority.

The transfer-books will be closed from Oct. 31 to Nov. 5, both days inclusive.

By order of the board.

oct25:2t WM. H. TILLINGHAST, Secretary.

NOTICE.—A Meeting of the Stockholders of the ARCTIC ICE AND REFRIGERATING COMPANY will be held at the Company's office, 167 Broadway, New York City, on the 29th of October, 1870, at 12 o'clock, noon, for the purpose of diminishing the capital stock of the company to the sum of five hundred thousand dollars, to be in shares of fifty dollars each.

J. M. TOMENY,
H. B. WILLSON,
W. E. PARISH,
F. W. KELLOGG,
A. D. PLATT,
P. H. VAN DER WEYDE,
} Trustees Arctic Ice and Ref. Co.

oct:3t

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Containing several hundred useful receipts to silicify Stone, Bricks and all Compositions of Minerals; to render R. R. Sleepers, Shingles, Wooden Pavements and Houses fire, water and dry rot proof; for making every species of Cements, Whitewashes, Paints and other Artificial Compositions; also, a guide for Soap and Glass Makers, concluded by Essays relating to the subject, such as Carbonic Acid, Limestones, Alkalies and Silica. Complete: price $3 12, mailed free by WESTERN & CO. 37 Park Row, New York. oct25:tf

E. T. MILLIKEN & CO., 139 MAIDEN Lane, New York, and 21 North Market street, Boston, manufacturers of superior Mining Machinery Oils; also Manufacturers and Dealers in Sperm, Whale, Elephant, Lard and Seal Oils; Dealers in Tanners' Curriers' Neat and Wool Oils. All goods guaranteed as represented. oct. 25:4t

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PATENT ROAD LOCOMOTIVE,

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500 IN REGULAR USE IN EUROPE,

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They are suitable for
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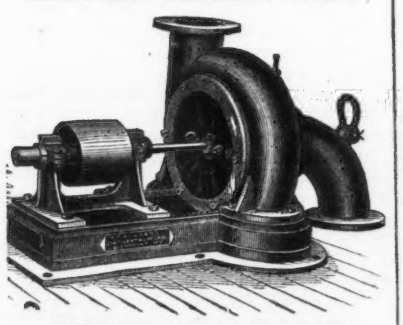

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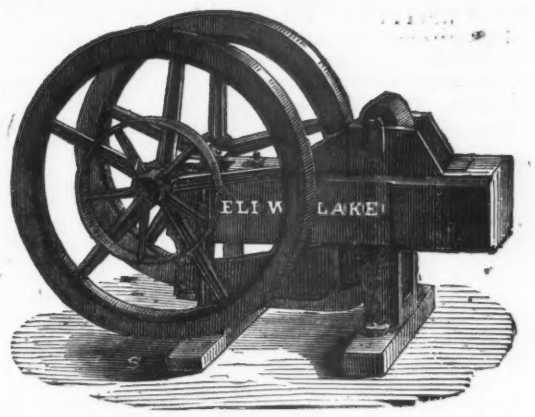

The office of this Machine is to break Ores and Minerals of every kind into small fragments, preparatory to their further comminution by other machinery.

This machine has now been in use, enduring the severest tests, for the last ten years, during which time it has been introduced into almost every country on the globe, and is everywhere received with great and increasing favor as a labor-saving machine of the first order.

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☞ The Patents obtained for this machine in the United States and in England having been fully sustained by the courts, after well contested suits in both countries, all persons are hereby cautioned not to violate them; and they are informed that every machine now in use or offered for sale, not made by us, in which the ores are crushed between upright convergent faces or jaws actuated by a revolving shaft and fly-wheel, are made and used in violation of our patent.

Mch. 14-1y. **BLAKE BROTHERS, New Haven, Conn.**

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May 24:1y

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JOHN JEWETT & SONS, AGENTS, 182 FRONT STREET, NEW YORK.

OXIDE OF ZINC, SPELTER, SHEET ZINC.

Jun28:1y

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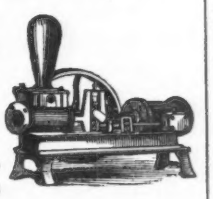
Patent Fly Wheel and Direct Action
STEAM PUMPS,
HAND PUMP AND STEAM ENGINE COMBINED.



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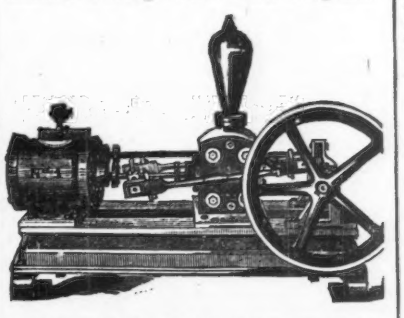

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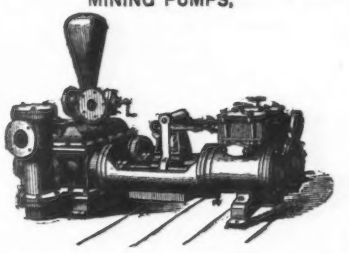

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" Weight of in shafts
" How to find the weight of
" Table of pressure in shafts
Expansion of
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" Rush of, into each division
" Quantity produced by natura ventilation
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Splitting, why the workmen object to Mr. Hopton adopting the mode
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Gases, (carbonic acid) composition of
" Do. properties of
" (After, or choke damp) composition of
" (Carburetted hydrogen) do.
" Choke damp and carbonic acid, not one and the same in quality
" The effect produced on people by inhaling such
" The quantity required for an explosive mixture
" The elasticity of
" The weight of
" The nature and quality of
" Why some mines generate and produce more than others
" Why some mines generate a mixture of
Goaf, or gob, how tramrods are made through (plan
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Temperature, difference of between down and up-cast
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Theodolites, how constructed
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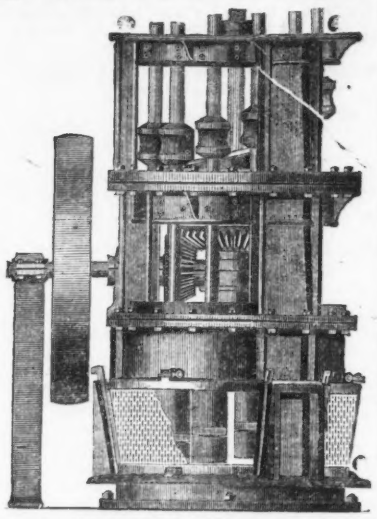

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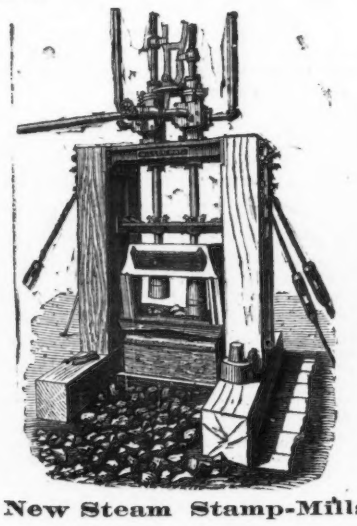

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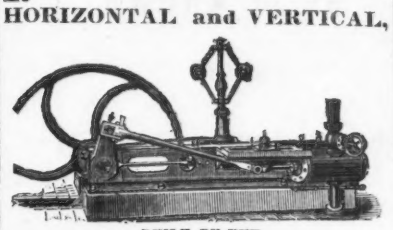

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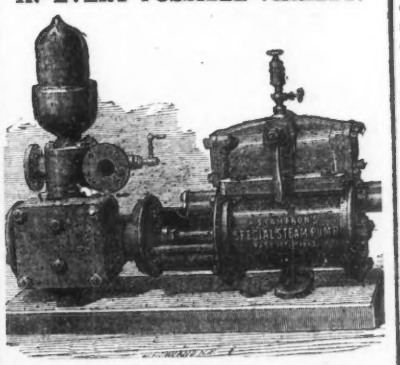

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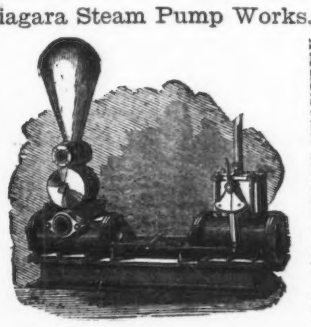

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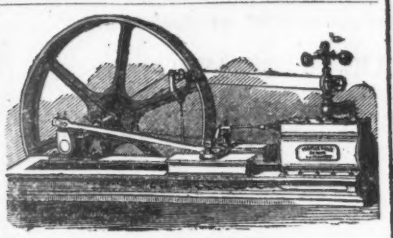

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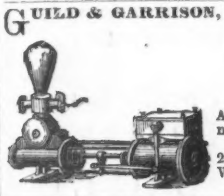

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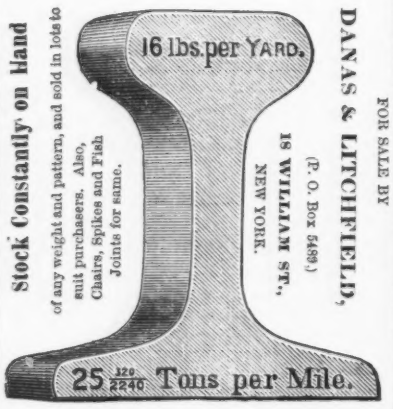
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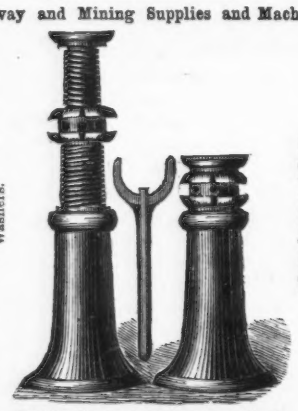

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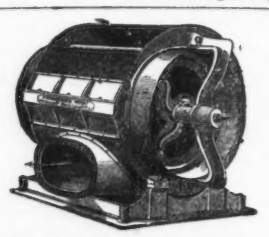

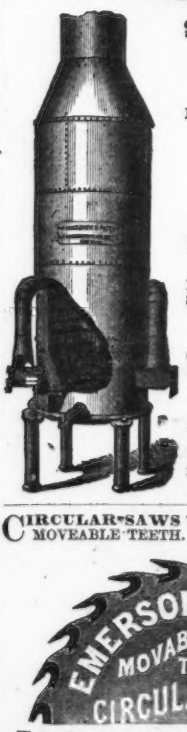

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